

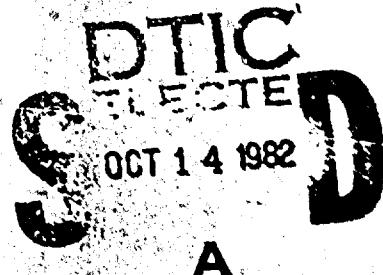
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EVALUATION OF THE INFLUENCE  
OF UPPER EXTREMITY BRACING TECHNIQUES  
ON HUMAN RESPONSE DURING VERTICAL IMPACT

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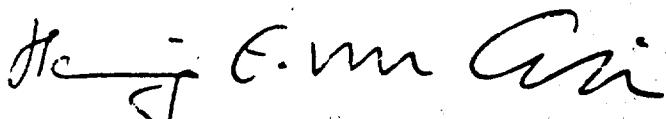
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The voluntary informed consent of the subjects used in this research was obtained as required by Air Force Regulation 169-3.

This report has been reviewed by the Office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

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**FOR THE COMMANDER**



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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  A test program was conducted to evaluate the effectiveness of upper extremity bracing techniques during +G <sub>Z</sub> impact acceleration. Fifty human impact tests were performed on the Vertical Deceleration Tower up to an impact level of 10.5 G mean (std dev = 0.23), 26 ft/sec velocity change. Subjects were restrained in the operational F/FB-111 crew seat and restraint system and were exposed to comparable impacts in different bracing conditions (including the currently recommended crossed-arms position and a proposed, alternate hands-on-		

Block 20 (continued).

knees position) to allow parametric analysis of the test results. Measured data included seat acceleration and velocity, head and chest translational acceleration components, triaxial forces acting on the seat and footrest, forces acting at the restraint harness attachments, and displacements of various body segments. Six of eighteen subjects physically could not perform the crossed-arms brace and thus could not be tested in that position. For the subjects tested in both conditions, seat pan loads were significantly less in the hands-on-knees position than in the crossed-arms position. There was no significant difference in maximum head displacement in the two conditions. On the basis of these findings, it is recommended that the hands-on-knees position be used by F/FB-111 ejectionees preparing for landing impact of the crew module. It appears that this technique may be utilized by all crewmembers and may afford them greater impact protection than the currently recommended procedure.

## PREFACE

This report was prepared by the Biomechanical Protection Branch, Biodynamics and Bioengineering Division of the Air Force Aerospace Medical Research Laboratory. The impact facilities and data collection equipment were operated by the Scientific Services Division of the Dynalectron Corporation under Air Force Contract F33615-79-C-0523. Mr. Harold F. Boedeker was the Engineering Supervisor for the Dynalectron Corporation.

The test fixtures used during the experimental phase of the effort were designed and built by General Dynamics, Fort Worth Division. The consultation provided by Dr. L. Kazarian during the planning of this test program is acknowledged.

Photographic support was provided by the 4950th Test Wing, Technical Photographic Division. Special acknowledgement is given to Mr. Paul Creiger for operation of the high speed motion picture cameras and to the many personnel who provided still photography coverage.

Anthropometric measurements of the test subjects were collected by Mr. Charles E. Clauser, Dr. Kenneth W. Kennedy, and Lt Col Maureen Lofberg of the Workload and Ergonomics Branch, Human Engineering Division of the Air Force Aerospace Medical Research Laboratory.

The authors wish to express their gratitude to the personnel of the Biomechanical Protection Branch who participated in the planning, preparation, and performance of the research program and in the preparation of this report. Special commendation is also given to the Air Force officers and airmen who volunteered to participate in the impact tests. The devotion, skill, and professionalism of the entire team of government and contractor personnel were vital to the successful and safe accomplishment of this evaluation.

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## SECTION 1

### INTRODUCTION

#### A. BACKGROUND

Voluntary bracing and pre-positioning prior to anticipated impacts are well-recognized techniques for minimizing the morbidity associated with such events. A review of the operational ejection data from 1966 to 1968 indicated that the incidence of vertebral fractures in Navy F-4 ejectees was approximately one-half the incidence of similar fractures in Air Force ejectees from the F-4. The majority of the Navy ejections were initiated by the face curtain technique (as shown in Figure 1), whereas the Air Force ejections were initiated by pulling a D-ring located between the legs (as shown in Figure 2). The former technique was believed to provide superior upper torso restraint, thereby decreasing hyperflexion and, in turn, the risk of vertebral fracture (Brinkley *et al.*, 1969).

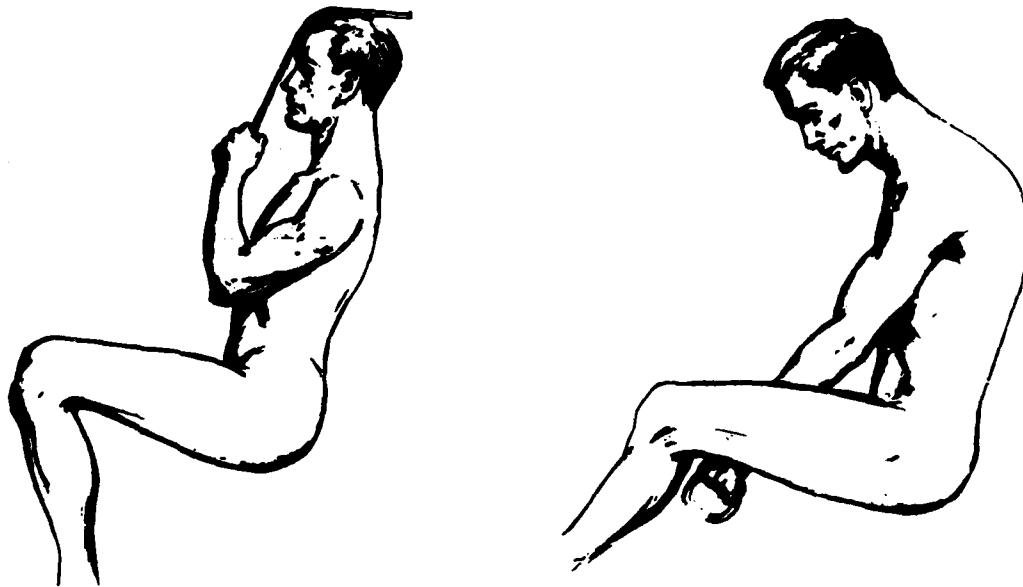


Figure 1. Face Curtain Position  
(Henzel, 1967).

Figure 2. D-Ring Position  
(Henzel, 1967).

Numerous evaluations exploring the effects of initial head position and of voluntary extremity bracing on human impact response have been reported. Ewing *et al.* (1976) found that peak angular velocity and peak angular acceleration of the head were significantly decreased during  $-G_x$  impact when subjects were pre-positioned with neck forward and chin down compared to subjects pre-positioned with neck up and chin up. Begeman *et al.* (1980) noted that more load was

transmitted through the legs to the floor in  $-G_x$  impacts when leg bracing was utilized compared to a relaxed condition. Similar fore-aft tests of human volunteers have suggested that impact tolerance may be increased by flexing the neck forward, tensing the body musculature, and bracing the lower extremities prior to the event (Hendler et al., 1974). Finally, Brinkley et al. (1982) have recently shown that pre-positioning the head forward of the plane of the seat back increases the inertial response of the head during  $+G_z$  impact.

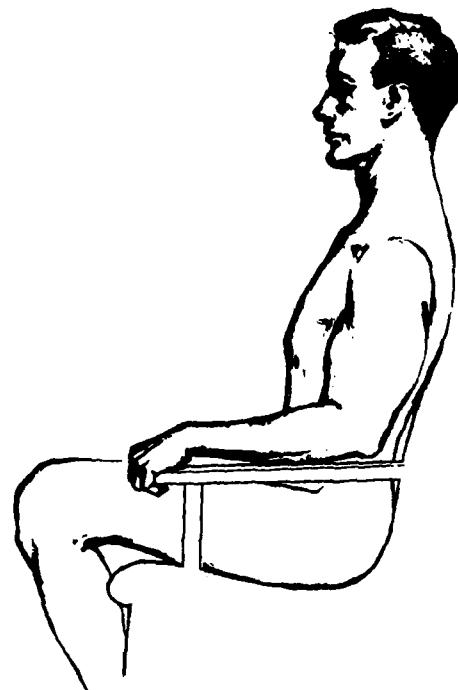


Figure 3. Arms Braced on Armrests (Henzel, 1967).

The potential for anterior vertebral fractures as the result of hyperflexion during  $+G_z$  impact acceleration is well known. A number of investigators, including Henzel (1967), have noted that the vertebral column may be partially unloaded during vertical impacts by bracing the upper extremities on properly positioned armrests, as shown in Figure 3. In this position, the arms and armrests provide alternate pathways by which the axial load experienced during  $+G_z$  impact may be partially carried. In fact, vertical human impact tests conducted in this position (Savely & Ames, 1946) demonstrated that significant loads may be carried through the upper extremities to the armrests. The usual primary pathway for transmission of axial load is the vertebral column. The majority of the load is commonly carried to the seat although a portion may be carried on through the lower extremities to the footrests.

A simple and biodynamically reasonable method to provide alternate pathways for transmission of axial loads in order to decrease vertebral loading during  $+G_z$  impact appears to be an upper extremity bracing technique shown in Figure 4. In this so-called "hands-on-knees" bracing technique, the upper extremities are

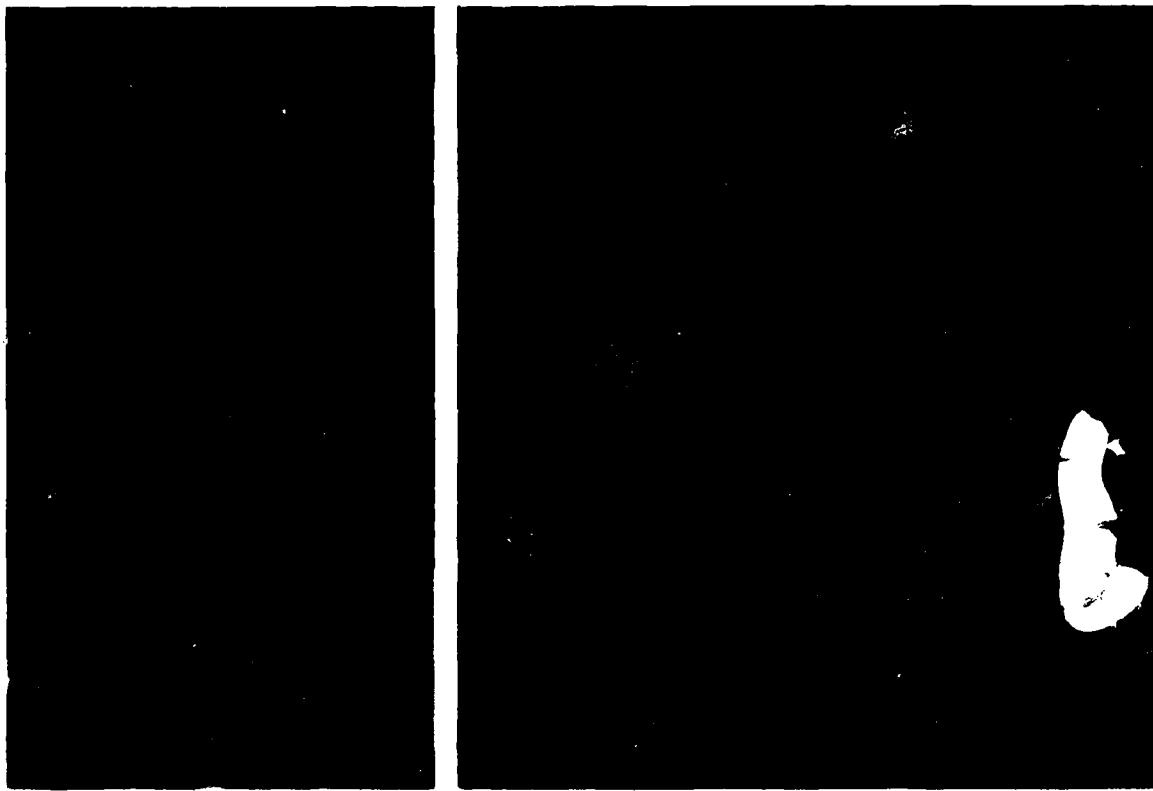


Figure 4. Hands-on-Knees Position.

extended as fully as possible and the hands are braced against the knees or anterior thighs. In addition, the head is braced against the headrest, the torso against the seat back, and the lower extremities are extended to brace the feet against the footrests. In a recent +G<sub>Z</sub> human impact test program (Brinkley *et al.*, 1982), this technique was demonstrated to react a greater proportion of the inertial response through the extremities to the footrests than a technique in which the hands were relaxed in the lap to preclude upper extremity bracing. The "hands-in-lap" position is shown in Figure 5.

An evaluation of the vertebral fractures incurred by F/FB-111 ejectionees (Kazarian, 1977) concluded that hyperflexion injuries (anterior vertebral fractures) were due to the ineffectiveness of the harness in providing adequate upper torso restraint during landing impact of the crew module. The operation of this escape system has been reviewed in considerable detail elsewhere (Brinkley *et al.*, 1981). An interim solution to the problem of hyperflexion injuries was proposed and was implemented as Technical Order 1F-111F-1SS-39 on 13 October 1975. The order recommends that the crewmember assume a crossed-arms bracing position, as shown in Figure 6, following ejection and prior to landing impact of the crew module. The steps in this recommended emergency procedure are as follows.

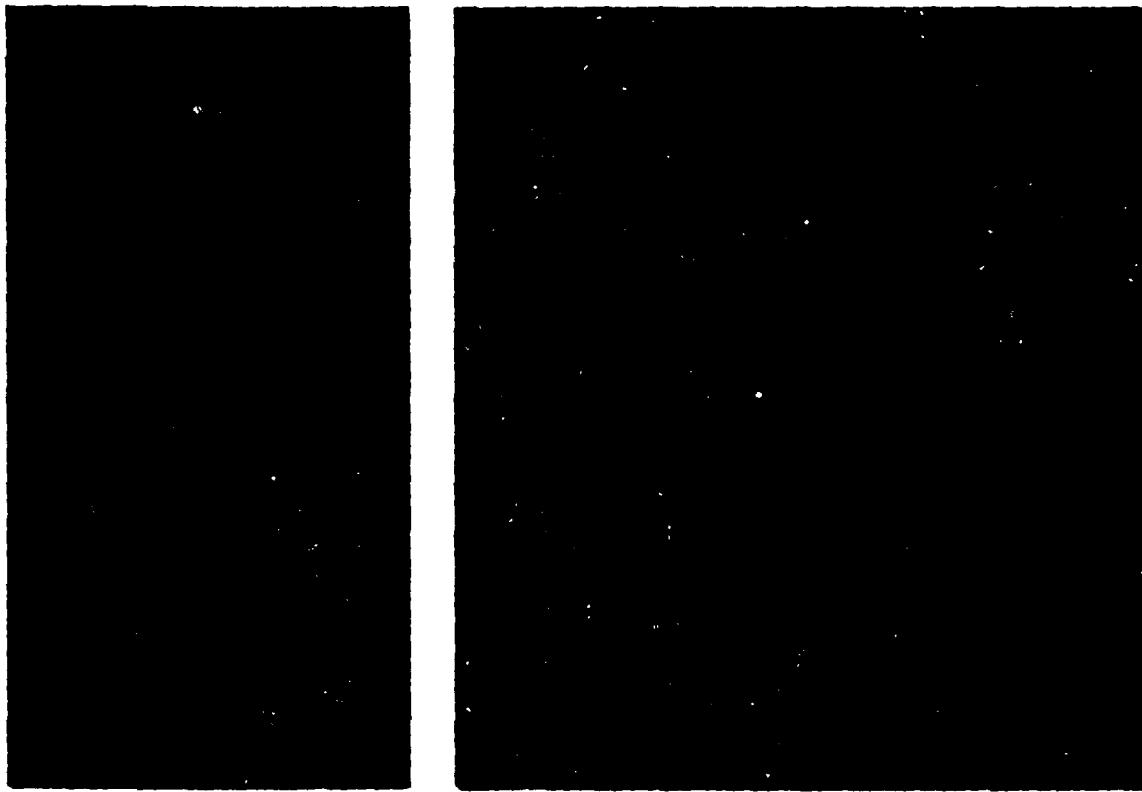


Figure 5. Hands-in-Lap Position.

1. Shoulder harness locked.
2. Seat pan as far forward as possible without causing leg contact with the instrument panel.
3. Feet on rudder pedals.
4. Back and head firmly against seat back and headrest, respectively.
5. Arms crossed in front of head, firmly grasping the shoulder harness straps as far aft as possible. Elbows raised until a pocket is formed by the arms and the arms are firmly in contact with the facemask assembly.

Prior to this change in procedure, the F/FB-111 technical order recommended that, if possible, the crewmember adjust his seat full down and aft prior to ejection. During module descent, the crewmember was instructed to cinch his harness tightly and to maintain a fully upright position, with head against the headrest. There was no recommendation for any upper extremity bracing at that time.

Originally, it was reported that ejection experience subsequent to implementation of the technical order demonstrated the effectiveness of the crossed-arms technique in reducing hyperflexion injuries (Kazarian *et al.*, 1979). However, in a more recent review of the operational ejection data (Hearon *et al.*, 1981), the presumed effectiveness of the technique could not be demonstrated. (See also

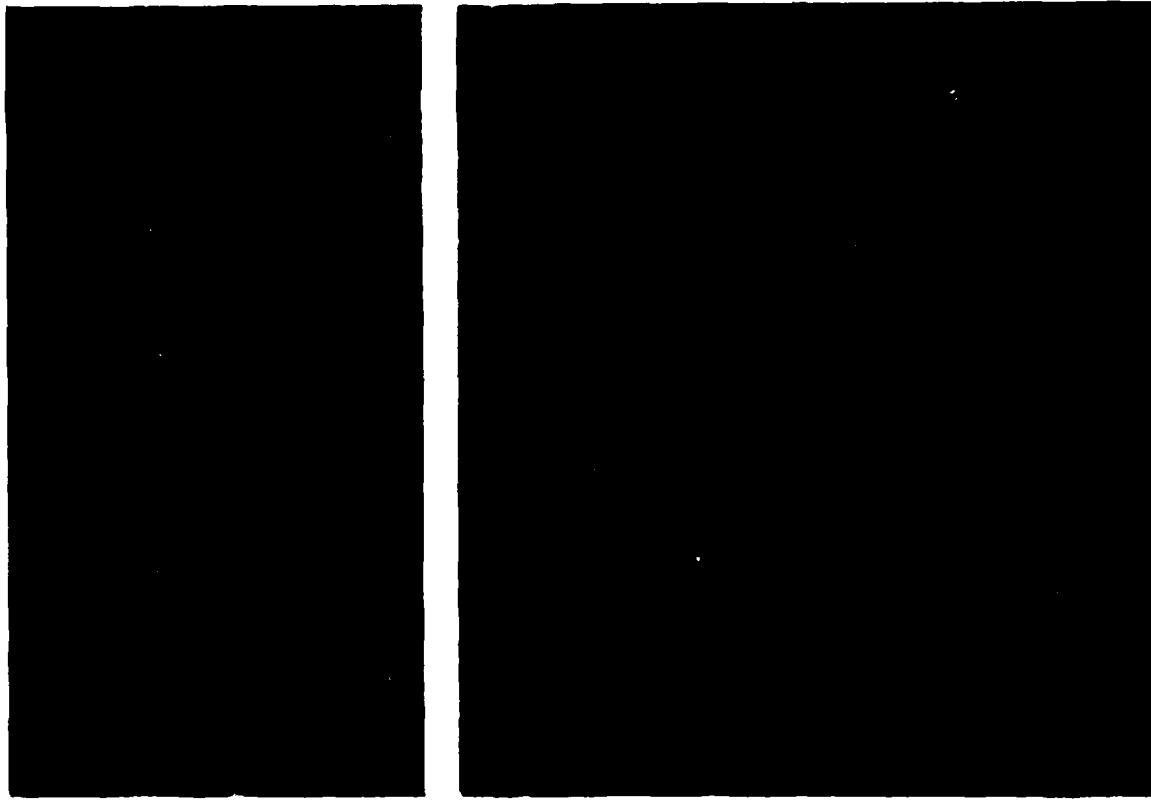


Figure 6. Crossed-Arms Position.

Section 5A). Since other upper extremity bracing techniques have not been utilized operationally in the F/FB-111 and since the recommended technique has not been evaluated under controlled laboratory conditions, an assessment of the performance of the recommended technique relative to alternate techniques appears to be operationally relevant.

#### B. PROGRAM OBJECTIVES

The primary purpose of this research effort was to compare the crossed-arms bracing technique to a proposed, alternate technique, the "hands-on-knees" position and to a third position ("hands-in-lap") in which upper extremity bracing was precluded. The experimental effort was designed to measure differences in the impact responses of volunteer test subjects as a function of the bracing condition. The program was also intended to correlate subject anthropometry with ability to comply with the crossed-arms bracing technique, to collect data for future protective equipment evaluation, and to provide data for ongoing efforts to develop mathematical models to predict human impact response.

This report (1) describes the impact tests accomplished to meet the program objectives outlined above, (2) presents analysis and interpretation of the collected data, (3) summarizes the results of the evaluation, and (4) presents a final recommendation regarding these bracing techniques.

## SECTION 2

### TECHNICAL APPROACH

#### A. EXPERIMENTAL DESIGN

The following null hypotheses were evaluated during this test program. First, human response to vertical impact in the currently recommended crossed-arms bracing position is not significantly different from such response in a proposed, alternate, hands-on-knees position. Second, human response to vertical impact in the crossed-arms position is not significantly different from such response in a hands-in-lap position, which precludes upper extremity bracing. Third, human response to vertical impact in the hands-on-knees position is not significantly different from such response in the hands-in-lap position. These questions have considerable operational relevance, since some F/FB-111 crewmembers have experienced difficulty assuming the crossed-arms position in training situations and also since a recent review of the operational ejection data (Hearon *et al.*, 1981) has indicated that full compliance with the crossed-arms technique among ejectees is only 50%. These data are reviewed more thoroughly in Section 5A.

Vertical acceleration tests were considered to be crucial in this evaluation, since a significant number of the vertebral fractures incurred by ejectees were attributed to the inadequacy of the operational restraint on landing impact (Kazarian, 1977) during which the largest component of the resultant module acceleration is in the Z axis (Brinkley *et al.*, 1981). The vertical impact profile selected for use during this program has been used extensively at the Air Force Aerospace Medical Research Laboratory (AFAMRL) in previous evaluations of restraint systems with human subjects.

Impact tests in the other cardinal axes or in a non-cardinal axis (in which the imposed resultant acceleration vector is not along any cardinal axis) were not conducted. To fully establish application to the F/FB-111 case, non-cardinal axis testing, always including a substantial +G<sub>Z</sub> component, would be desirable. However, any F/FB-111 bracing maneuver for landing impact must at least be effective for pure vertical acceleration.

In order to minimize the potential for injury to human subjects, these tests were conducted at what is considered to be subinjury impact acceleration levels. The nominal 10 G peak carriage acceleration level was selected as the experimental level, since some comparable test data at this level was already available and since, on the basis of prior experience, the risk of subject injury at this level was acceptably low. At the same time, the forces acting on the subject at this exposure level are generally sufficient to overwhelm the variable forces created by voluntary neck and torso muscle contraction, thereby producing a response suitable for comparative parametric analysis.

The sample of subjects selected to participate in this test program is comparable to a flying population in terms of age, sex, and anthropometry. As the number of female flyers has increased, efforts have been made to introduce qualified female subjects into AFAMRL impact test programs. One female subject was among the eighteen volunteers who participated in this test program. The medical screening of all subjects prior to participation continues to be more highly selective than a routine USAF Flying Class I evaluation, resulting in a

panel of volunteers who are expected to be supranormal in terms of impact injury tolerance (Hearon & Raddin, 1981). This difference in the populations of interest has a negligible influence on the significance of results of tests such as these, since all tests were conducted below anticipated injury threshold, even for a normal population. Such a conservative approach to subject screening is necessary to assure subject safety.

TABLE 1. EXPERIMENTAL MATRIX

CELL	BRACING TECHNIQUE
G	Hands Relaxed In Lap
K	Crossed-Arms
L	Hands-On-Knees

The experimental matrix for this test program is shown in Table 1. The program was designed to evaluate the influence of upper extremity bracing techniques on human response to impact. All tests in the matrix were conducted in the operational F/FB-111 crew seat and restraint system. The plane of the seat back was perpendicular to the plane of the seat pan and parallel to the impact vector ( $90^{\circ}$  seat back angle condition) for all tests. This seat configuration was achieved by adjusting the headrest full forward and the seat pan full aft, as shown in Figure 7. In this position, the contact point of the subject's flight helmet was  $2\frac{1}{4}$  inches forward of the plane of the seat back.

Tests in the G cell of the experimental matrix were completed as part of an F/FB-111 test program which preceded this study (Hearon *et al.*, 1982b). The seat vertical adjustment in the present study was held constant for all subjects in the full-down or near full-down position. Each subject was exposed to impacts in the K and L cells of the experimental matrix at the same seat elevation utilized in the G cell exposure. The method used for selecting the appropriate seat height for a subject has been previously described (Hearon *et al.*, 1982b). In the G cell, tests were conducted without oxygen masks. In the K and L cell tests, oxygen masks were utilized.

The test conditions described in the preceding paragraphs were chosen in order to best achieve the objectives of this test program. For example, the  $90^{\circ}$  seat back angle position was selected for investigation because previous vertical impact tests of the modified harness had demonstrated that measured human inertial response could be expected to be more severe in this condition than in similar exposures with the seat back reclined. In particular, forward head accelerations and vertical seat pan reaction loads were significantly higher with the seat back angle at  $90^{\circ}$  than with the seat back angle at  $103^{\circ}$  or  $110^{\circ}$  (Brinkley *et al.*, 1981). This allowed greater observability of the effects of harness variations. In addition, the relatively stable performance of the

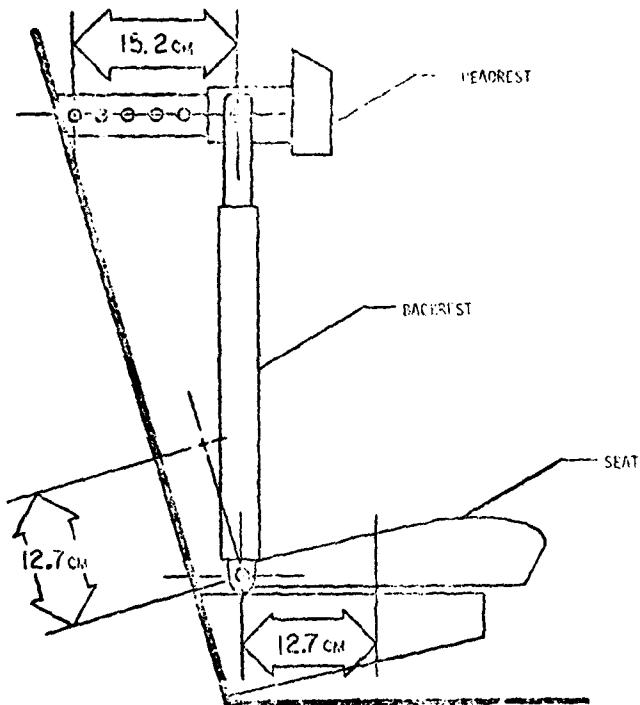


Figure 7. F/FB-111 Crew Seat Geometry.

operational F/FB-111 harness in vertical impacts at different seat vertical adjustments (Hearon *et al.*, 1982b) appears to indicate that the seat elevation chosen for these tests was not crucial in achieving the objectives of the test program.

Impact tests were conducted in all cells of the experimental matrix using an anthropomorphic dummy prior to initiating tests with volunteer subjects. As an additional safety precaution, a dummy test was performed each day prior to testing with human subjects.

The controlled variables during these experiments were the carriage drop height, the upper extremity bracing technique, the restraint harness, the seat vertical adjustment, and the subject population. The carriage drop height was 11.0 feet for all tests, corresponding to a nominal 10 G peak (26 ft/sec) exposure.

The observable variables which were measured during these experiments included the restraint harness geometry (eg., inertia reel strap angles), the restraint harness static preloads, the restraint harness loads during impact (eg., inertia reel strap and lap belt loads), the forces (horizontal, lateral, and vertical) reacted at the seat pan and footrest during the impact, the triaxial translational acceleration components measured at the seat pan and at the subject's head and chest, and the displacements (with respect to the seat) of photometric targets on the subject's body segments. The potential measurement error of the accelerometers, load cells, strain gages, and other devices utilized to make these measurements is detailed in Appendix A.

Significant unobservable variables during these experiments included the motion of each vertebral body and the force distribution along the vertebral column during the impact event.

#### B. EVALUATION CRITERIA

The ability of each subject to perform the crossed-arms brace in the specified seat position was assessed. The subject was required to demonstrate the ability to encircle both inertia reel straps with at least the thumb and forefinger of both hands. Those who were able to do so were exposed in the K cell and subsequently in the L cell of the experimental matrix. Those who were unable to reach the inertia reel straps and perform the crossed-arms brace were exposed in the L cell alone. Subjects had previously been exposed in the G cell of the experimental matrix.

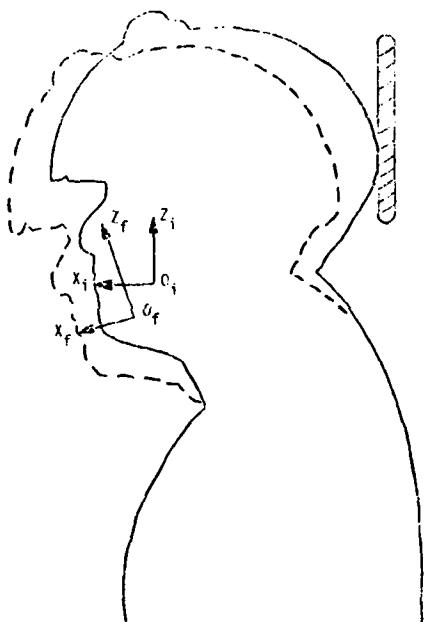


Figure 8. Rotation of the Head Accelerometer Array (Located at the Origin of the Coordinate System) During Vertical Impact.

The electronic measurements obtained during these experiments included the tension-time histories of the various restraint harness straps measured at their attachment points, the force-time histories of the loads reacted into the seat pan and footrest, and the acceleration-time histories of the subject's head and chest and of the seat pan and drop carriage as well. It should be noted that the accelerometer arrays attached to the subjects were, in general, rotating measurement coordinate frames which measured translational acceleration components summed with translational components resulting from angular motions. One implication of this observation is that, as the head rotated down and forward, vertical acceleration of the head with respect to the laboratory reference

frame transitioned from a Z axis (vertical) to an X axis (fore-aft) measured acceleration with respect to the head. This situation is illustrated in Fig. 8. Another implication is that separation of translational accelerations of the effective center of gravity and translational acceleration components resulting from rotational motions cannot be achieved with the three orthogonal linear accelerometers utilized in these experiments. The relevant equations have been summarized elsewhere (Simons et al., 1979). For the purposes of this test program, it was adequate to measure the mixed translational data and track rotational motion photometrically.

Evaluation of the entire measured acceleration-time histories of chest and head was accomplished by calculating Severity Indices (Gadd, 1966). These single parameters, which were derived by a weighted integral of the acceleration-time function taken over the interval of the impact ( $SI = a^n(t)dt$ , where  $n = 2.5$ ), were used to compare the severities of impact responses. No exposure limit values were assigned to the chest or head acceleration Severity Indices. Instead, they were used only in a relative sense for purposes of comparison.

The Wilcoxon paired-replicate rank test (Wilcoxon & Wilcox, 1964) was the statistical technique selected to compare the peak values of specific measured parameters and to establish the statistical significance of observed trends in the data. Experimentally-measured parameters for each subject were arithmetically compared with the same parameters measured for the same subject in a different (but comparable) test condition, thereby establishing pair differences. When a sufficient number of pair differences for a specific parameter changed in the same direction for a variety of subjects, a trend was established as statistically significant by the Wilcoxon technique. The 90% confidence level was defined as the level of statistical significance for rejection of the null hypothesis, assuming a two-tailed test.

The advantages of employing this statistical technique are particularly noteworthy in these experiments. The technique is comparative and, therefore, is readily applied to the comparison of upper extremity bracing techniques. Also, the method establishes each subject as his own control, thereby reducing the effects of biological variability on the data. In addition, a relatively small number of paired-replicates (5) is the minimum number required to permit a valid conclusion at the chosen significance level. This limits the total number of tests required to establish statistically significant trends in the test results.

The disadvantages of the Wilcoxon technique, however, must also be considered. Although the trend (direction) of a statistically significant difference in a given parameter is indicated, the magnitude of that difference is not quantified by the technique. (The difference between the means of the two sets of parameters being compared may be easily computed, however.) The method is also less sensitive than, for example, the analysis of variance. As in any statistical technique, statistical significance can be computed, but practical significance must be judged.

Statistically significant trends in test parameters between two test conditions were critical in this comparative evaluation of bracing techniques. Generally, trends in specific parameters differ in practical importance. In this test program, for example, there was limited interest in the loads reacted into the lap belt, since all tests were conducted in the Z axis with an un reclined seat

back, thereby minimizing variation in lap belt reaction loads. However, in view of the relatively high incidence of vertebral fractures experienced by F/FB-111 ejectionees operationally, the more crucial considerations were the trends in the experimentally-measured seat pan reaction loads and the head and chest accelerations. At this time, the loads reacted at the seat pan are the best indirect measurement of the magnitude of vertebral column loading during impact.

In the final analysis, the overall distribution of statistically significant trends in all test parameters being compared generally assumes greater importance than the trend of any single parameter. At times, a "beneficial" trend in one parameter may be accompanied by a "detrimental" trend in another. In this circumstance, a careful evaluation of the "trade-offs" among parameters is necessary, in order to accurately assess which test configuration is "best" or perhaps which is the lesser of two evils. It is conceivable that, in some circumstances, such a determination may not be possible.

For ethical and moral reasons, it is not possible to design and conduct impact experiments in the laboratory with human subjects at operational exposure levels where there is a known probability of injury. These tests, therefore, were performed at subinjury impact levels which have been demonstrated to be well within human tolerance and where the risk of injury is acceptably low. However, the levels were sufficiently high to overcome voluntary muscle resistance and approach the operational range. Increasing the magnitude of the impact accelerations could be expected to lead to increases in response until a non-linearity occurs in the form of injury. The statistically significant trends reported herein for this experimental level cannot be extrapolated to operational levels for the purpose of predicting injury rates. However, the trends discovered at this experimental level should be valid with increasing levels of impact until the non-linearities associated with injury are encountered.

## SECTION 3

### TEST EQUIPMENT, METHODS, AND FACILITIES

#### A. VERTICAL DECELERATION TOWER

The AFAMRL Vertical Deceleration Tower (VDT), shown in Figure 9, was used for this impact test series. This facility consists of a 60 ft vertical steel tower, which supports a guide rail system, an impact carriage, a hydraulic deceleration device, and a test control and safety system. The impact carriage used to carry the test specimen can be elevated to a maximum height of 42 ft prior to release. After release, the carriage falls until a plunger attached to the carriage enters a water-filled cylinder located at the base of the tower. The deceleration profile produced as the plunger displaces the water in the cylinder is a function of the free fall distance, the carriage and test specimen mass, the shape and size of the plunger, and the diameter of the cylinder orifice.

A typical acceleration-time history recorded on the impact carriage during this test program is shown in Figure 10. The 10 G test level mean peak carriage acceleration for the entire vertical test series was 10.5 G with an estimated standard deviation of 0.23.

#### B. CREW SEAT AND RESTRAINT SYSTEM

The crew seat used in the test program is a unit that was salvaged from an F-111 crew escape module. The seat was attached to the impact facility using a special structure that was designed and fabricated by the General Dynamics Corporation under Contract No. F33657-78-C-0651. This fixture, shown in Figure 11, supported the seat and aircraft rudder pedal control footrest. The seat and the rudder pedals were instrumented to measure the loads reacted by the subject into these structures during the experiment. The design configuration of the seat and its components is described more completely elsewhere (Brinkley *et al.*, 1981).

The inertial reel was not used in the test program. It was replaced by a simple webbing clamp bar located at the centerline of the reel.

The operational F/FB-111 restraint harness, shown in Figure 12, was used for all tests in this series. The reflection straps of the operational harness are attached to the upper portion of the seat back 24.09 inches above the seat reference axis (the intersection of the planes of the compressed backrest cushion and the seat cushion). These points move vertically as the seat bucket is moved up or down. However, the location of the inertia reel anchor points is fixed. The angle made by the inertia reel strap and a reference horizontal, therefore, varies as a function of seat vertical adjustment. The F/FB-111 restraint harness geometry has been thoroughly discussed elsewhere (Brinkley *et al.*, 1981; Hearon *et al.*, 1982b).

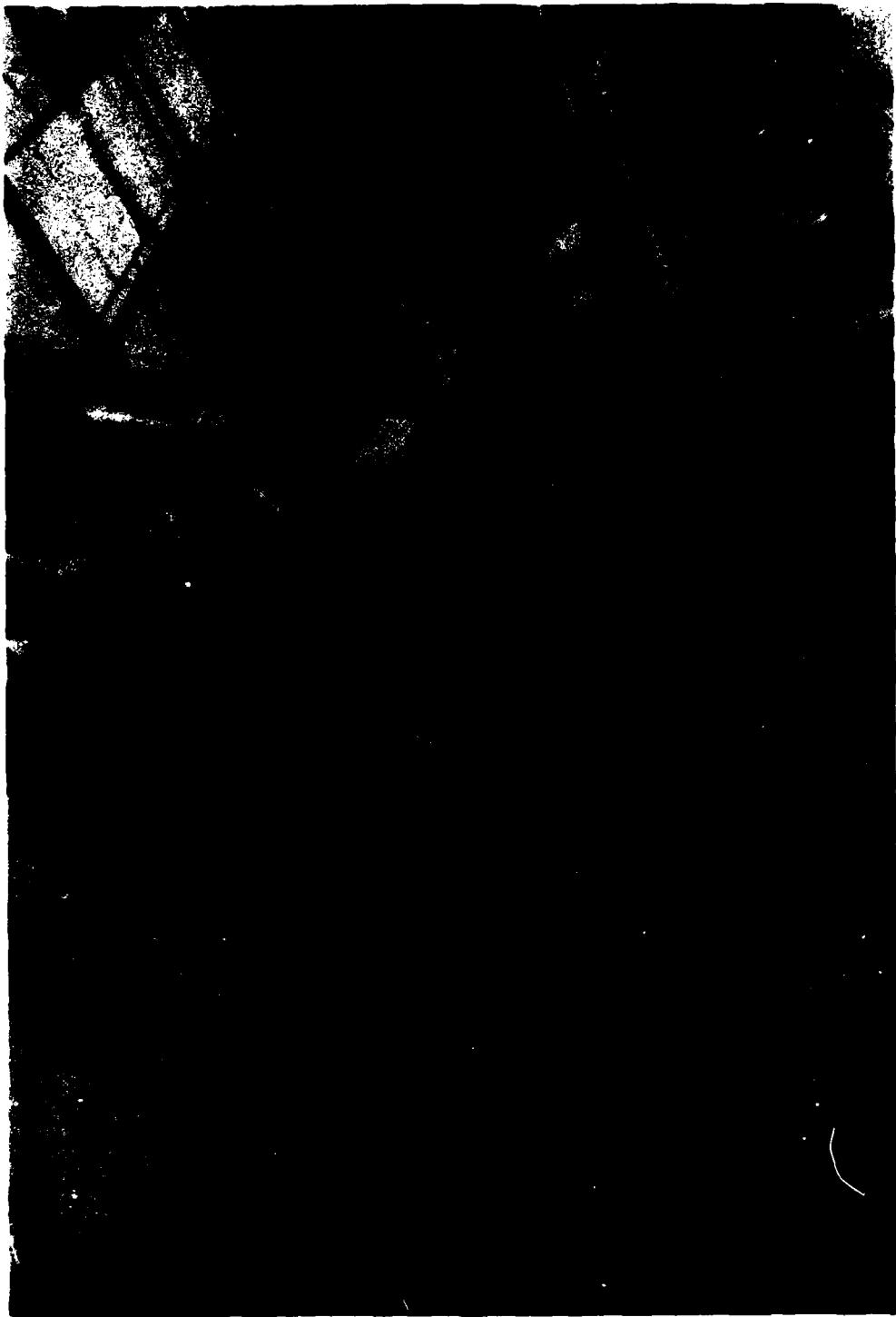


Figure 9. The AFAMRL Vertical Deceleration Tower and F/FB-111 Test Fixture.

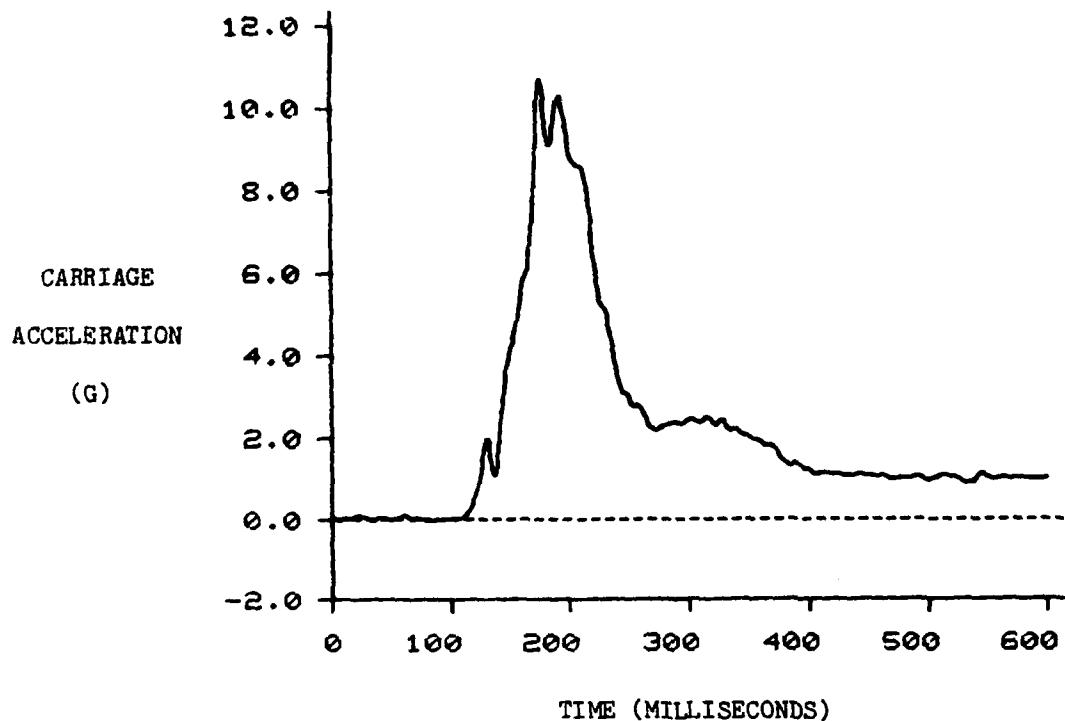


Figure 10. Typical Carriage Acceleration Profile.

The restraint system was pretensioned prior to the impact experiment. The lap belt pretension was  $20 \pm 5$  lb measured by strain gages mounted on the lap belt end attachment fittings. The total load acting on each shoulder strap was set at  $14 \pm 5$  lb by measuring the loads at the end fittings of each reflection strap and using Lebow gages attached to the inertia reel straps. This preload procedure imposes a load on the subject which is lower than the maximum load (50 lb in each shoulder strap) expected during operational use of the inertia reel. However, previous tests of similar restraints in England (Reader, 1967) and at Holloman AFB (Zaborowski, 1965) resulted in subject complaints when preloads of 50 lb or greater per strap were imposed. In view of these reports, and since imposition of static preloads on the subject was required for relatively long periods of time (approximately 15 minutes) prior to the impact event, imposition of preloads of such magnitude was neither practical nor desirable. In addition, previous experience at AFAMRL has shown that significant variations in restraint performance do not occur unless the pretension is well below 20 lb. Therefore, the aforementioned pretensions were deemed adequate.

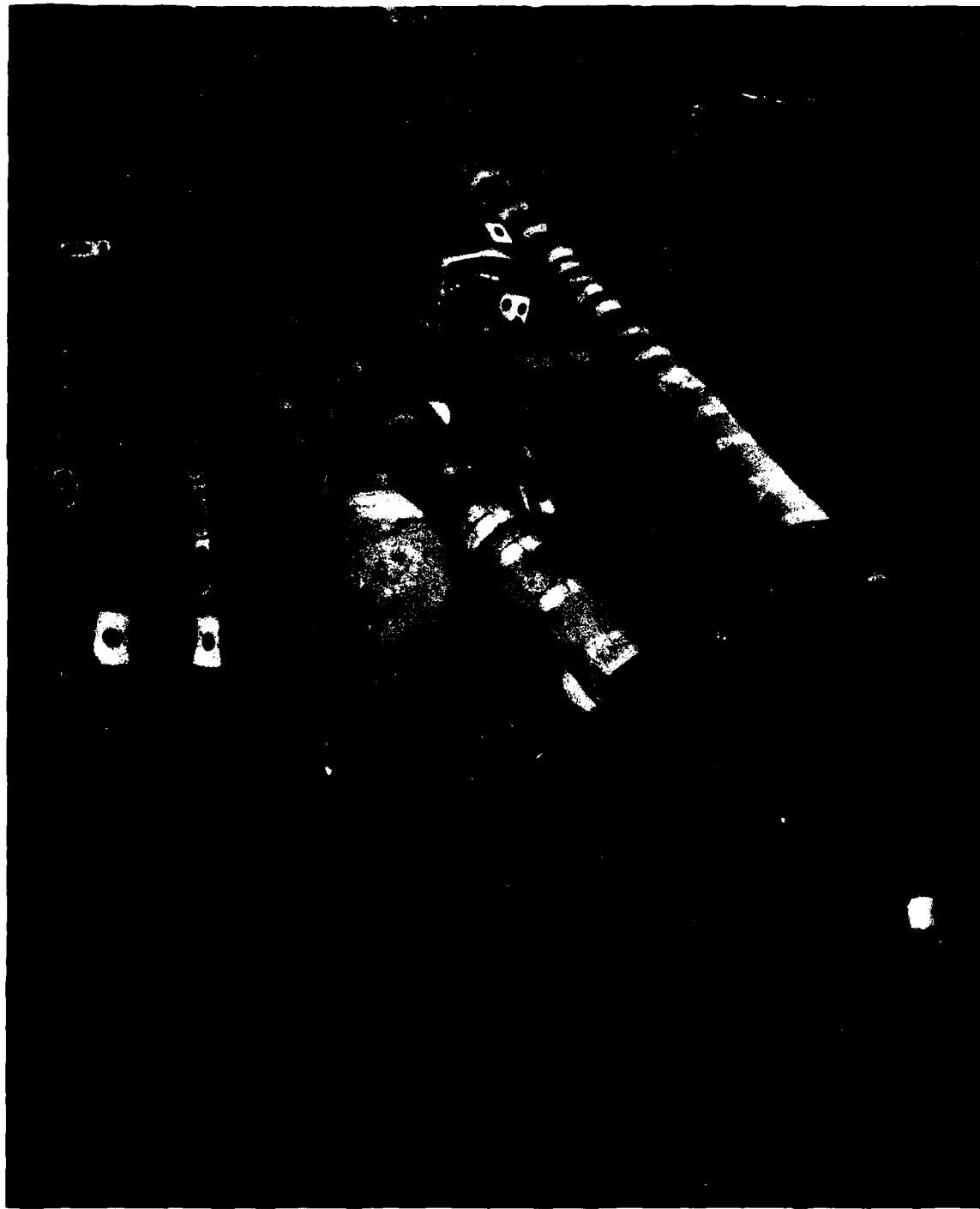


Figure 11. Test Fixture with Rudder Pedal Support Structure.

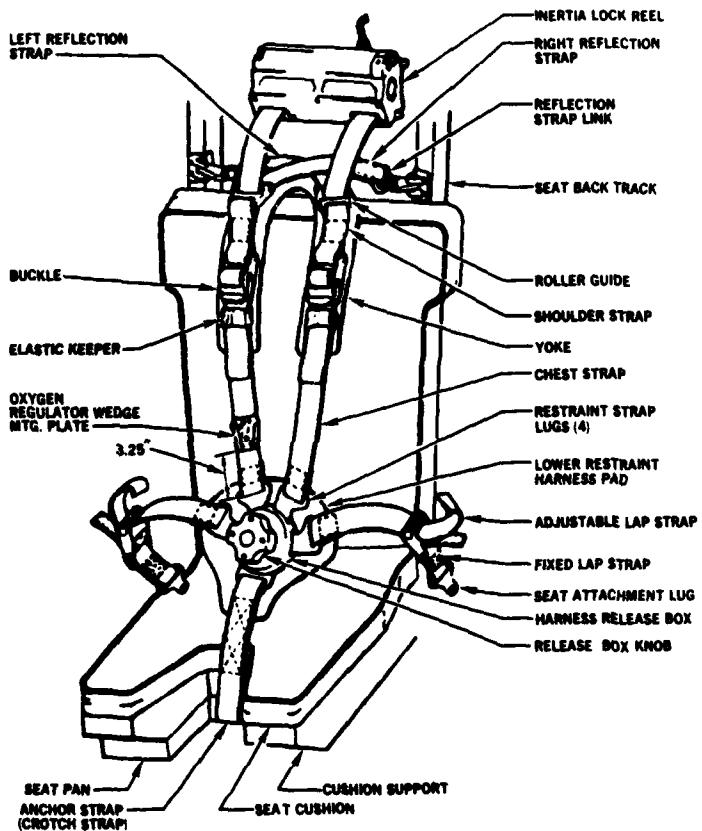


Figure 12. Operational F/FB-111 Crew Seat and Restraint System.

### C. DATA ACQUISITION

Electronic data collected during the test program included impact carriage acceleration and velocity, test fixture loads and acceleration, subject head and chest acceleration, harness loads, and single-lead electrocardiograms. Detailed descriptions of the instrumentation, electronic data processing equipment, mounting procedures, and calibration techniques are provided in Appendix A. The following information summarizes the electronic instrumentation that was used to acquire the test data.

Carriage acceleration was measured using three miniature, piezoresistive accelerometers mounted to the structure of the VDT carriage. Vertical velocity was determined at the point of impact, i.e., the point where the carriage plunger contacted the water in the deceleration cylinder by using a velocity wheel (tachometer).

The test fixture was instrumented to measure the forces reacted into the seat, restraint, and footrest by the subject. Triaxial acceleration was measured on the seat pan structure to quantify the impact exposure. The seat pan structure included three load cells and three load links to measure the vertical and horizontal forces reacted through the structure. Forces were measured in the

restraint system using strain gages bonded to the seat attachment hardware or Lebow belt load cells. Leg forces were measured by three triaxial load cells which were incorporated within the rudder pedal support structure.

Triaxial accelerometer arrays were used to measure acceleration on the head and chest of each subject. The chest accelerometer package was held tightly against the subject's sternum by a Velcro chest strap. The subject's head accelerometers were mounted on a dental bite block, which was held in the subject's mouth during the test. This technique has proven to be not only a safe means of providing intraoral/dental protection during impact, but also an effective way of minimizing movement of the accelerometer package relative to the subject's head during impact.

The electronic data obtained from the transducers described above were encoded into pulse code modulation digital format and then transmitted by telemetry to a word formatter. The word formatter reformatting the serial data into parallel data which was transmitted to a PDP 11/34 computer for recording and processing.

Photometric data were collected using two high speed (500 frames per second), 16 mm Milliken cameras mounted on the impact carriage. One camera was mounted to the right of the subject perpendicular to the sagittal plane. The second camera was mounted above the footrest to provide a frontal view of the subject. The movements of the subject's helmet, head, shoulders, arms, and the chest accelerometer package were quantified by tracking the motion of fiducials attached to these sites. The fiducials which were attached to the subjects and to the test fixture consisted of a one-half inch diameter black circle printed on a one inch diameter white circle. The locations of the fiducials generally followed the guidelines provided in "Film Analysis Guides for Dynamic Studies of Test Subjects, Recommended Practice" (SAE J138, March 1980). More complete descriptions of the fiducial locations as well as the photometric instrumentation system are provided in Appendices A and D. Timing reference marks were recorded on the 16 mm film once every 0.01 sec. These reference marks were synchronized with the electronic instrumentation recordings.

A video camera was also used to document the tests. This camera and accompanying recorder operate at 120 frames per second with an effective shutter speed of 10 microseconds or less. Use of this system allowed the investigators to evaluate the kinematic response of each subject immediately after each test. This system is described in Appendix A.

Photographs of the test subject and equipment configuration were taken prior to each test. Items of special interest were photographed as required.

#### D. TEST SUBJECTS

The test dummy used for this program was an Alderson Research Laboratories, Inc., model VIP-95 dummy (serial number 124), which was designed to represent a 95th percentile (weight) adult male. The dummy was originally built for -G<sub>x</sub> automotive crash testing, based on specifications furnished to Alderson by the National Highway Traffic Safety Administration. It was designed to reproduce the head-neck response of human cadavers in forward facing impacts, but was not designed to produce meaningful response dynamics in vertical impacts. This limitation was not a critical factor in the current study, since the dummy was used only to verify the structural integrity of the test apparatus prior to human testing. The dummy's joints were adjusted to a nominal one G value, in accordance with the U.S. Department of Transportation Federal Motor Vehicle Safety Standard No. 208.

All human volunteer subjects who participated in this test program were members of the AFAMRL Impact Acceleration Stress Panel. This panel is composed of volunteer active duty Air Force members whose primary duties do not involve participation as subjects. A total of 18 subjects was utilized during this test program. There were no special technical qualifications or training requirements for subjects. However, all subjects were qualified to participate only after successfully completing an intensive medical screening evaluation (Hearon & Raddin, 1981). This evaluation was directed by the panel physician and consisted of medical history screening, physical examination, visual acuity testing, audiometry, blood pressure measurement, routine laboratory examination (blood work and urinalysis), standard 12-lead electrocardiogram, pulmonary function tests, electroencephalogram, treadmill exercise stress test, and x-rays, including chest, skull, and complete spine films. The x-rays were reviewed by the panel physician in consultation with a radiologist (and orthopedic surgeon, as necessary) to assure elimination of individuals with disqualifying radiographic findings. Female subjects had a negative pregnancy test documented and underwent a pelvic exam by a gynecologist, to assure there were no gynecologic contraindications to their participation. Relevant abnormalities in any part of the medical evaluation led to elimination of the candidate or specialty consultation and further examination, as required. Annual re-qualification of panel members was accomplished with a limited medical evaluation, including a physical examination and other relevant medical tests.

The generic human use protocol under which these impact tests were conducted was AFAMRL Protocol No. 80-01, "Generic Impact Acceleration Protocol, 1980". This document presented a survey of available human biodynamic test data, established broad generic exposure limits for human impact testing, and described the generic medical risks associated with such tests. Following review by the AFAMRL Human Use Review Committee (HURC) on 10 January 1980, this protocol was recommended for approval by higher authority. Subsequently, the protocol was approved by AFAMRL/CC and, as SGO R-80-001, it was approved by USAF/SG on 7 March 1980.

The specific human use protocol under which these impact tests were conducted was AFAMRL Protocol No. 80-40, "Evaluation of the Crossed-Arms Bracing Technique (Utilized By F/FB-111 Crewmembers Preparing For Ground Landing) During +G<sub>z</sub> Impact Acceleration". This document summarized the operational F/FB-111 ejection data and the specific medical risks associated with the proposed human tests. The overall risk of injury to human subjects was judged to be acceptable

when compared to minimizing F/FB-111 crewmember morbidity during emergency escape. The proposed acceleration test levels were well below the levels experienced operationally during landing impact. This human use protocol was reviewed and recommended for approval by the AFAMRL/HURC on 31 October 1980 and was subsequently approved by AFAMRL/CC.

The tests which comprise the G cell of the experimental matrix were conducted as part of another F/FB-111 test program (Hearon et al., 1982b) which preceded this study. The specific human use protocol under which these tests were conducted was AFAMRL Protocol No. 80-37, "Evaluation of the Influence of Negative Shoulder Harness Angles in the Operational F/FB-111 Crew Seat and Restraint System During +G<sub>Z</sub> Impact Acceleration". Protocols 80-37 and 80-40 were specific protocols submitted under the "Generic Impact Acceleration Protocol, 1980," Protocol 80-01, and as such required local consideration and approval only, in accordance with AFR 169-3, "Use of Human Subjects in Research Development, Test, and Evaluation" (February 1979).

Ongoing informed consent was provided by all subjects during the test program. Prior to testing, subjects received a thorough briefing on the experimental procedures and potential medical risks of participation. The subjects signed a witnessed consent form attesting to the fact that a detailed briefing was received and summarizing its content. Throughout the test program, the medical investigator continued to stress that any subject was free to withdraw at any time for any reason.

Table 2 is a summary of selected anthropometric values for each subject. The mean and standard deviation computed from each set of dimensions compare favorably with the mean and standard deviation of the dimensions obtained from an anthropometric survey of USAF personnel conducted in 1967 and published in AFSC Design Handbook 2-2. Forty-nine anthropometric measurements were obtained from each subject. The mean, estimated standard deviation, and range of selected group measurements are listed in Table 3. Weight is expressed in pounds and all other parameters are expressed in inches.

TABLE 2. INDIVIDUAL SUBJECT ANTHROPOMETRY SUMMARY

SUBJECT NUMBER	WEIGHT (lb)	STATURE (in)	SITTING HEIGHT (in)	MID-SHOULDER SITTING HEIGHT (in)
D-1	203	73.6	39.7	28.0
F-3	167	68.6	36.4	25.5
F-2	159	67.1	37.5	26.3
F-4	142	67.0	36.4	24.7
G-3	164	67.1	34.8	25.0
G-2	117	62.9	33.3	23.2
H-3	186	73.9	38.0	26.1
H-5	139	68.5	35.6	24.1
H-4	192	67.7	37.0	25.7
K-1	169	67.1	35.7	24.8
M-2	162	66.1	35.2	24.0
M-10	140	65.7	36.1	24.8
M-11	145	69.5	35.7	25.4
M-13	169	73.0	37.3	26.3
P-3	198	72.8	39.1	27.7
R-2	148	68.1	35.9	24.3
R-3	146	66.2	35.2	23.9
S-3	167	69.6	36.6	25.6
MEAN	162	68.6	36.4	25.3
STD DEV	22.7	3.02	1.52	1.26

TABLE 3. COLLECTIVE SUBJECT ANTHROPOMETRY SUMMARY

ANTHROPOMETRIC MEASUREMENT	MEAN	STD DEV	RANGE
Weight	161	22.7	117 - 203
Stature	68.6	3.02	62.9 - 73.9
Cervicale Height	58.7	2.84	54.4 - 63.8
Trochanteric Height	35.9	2.29	32.3 - 39.9
Tibiale Height	17.6	1.15	15.8 - 20.3
Chest Circumference	38.2	2.34	33.7 - 42.7
Waist Circumference	33.3	2.64	29.6 - 39.1
Buttock Circumference	36.0	8.27	35.0 - 42.4
Acromion-Radiale Length	12.2	2.87	11.7 - 14.4
Radiale-Stylium Length	9.4	2.89	8.5 - 11.3
Sitting Height	36.4	1.52	33.3 - 39.7
Mid-Shoulder Sitting Height	25.3	1.26	23.2 - 28.0
Buttock-Knee Length	23.8	1.24	21.9 - 26.3
Knee Height, Sitting	21.4	1.30	18.7 - 23.7
Head Length	7.3	1.78	7.2 - 8.2
Head Breadth	6.0	0.21	5.6 - 6.4
Head Circumference	22.4	0.64	21.5 - 23.6
Hip Breadth, Sitting	14.4	0.77	13.2 - 15.9

#### E. EXPERIMENT SEQUENCE

The controlled parameters during this program were the carriage drop height, the seat vertical adjustment, and the upper extremity bracing technique. The relation between carriage drop height and resulting acceleration exposure had been well established during preceding test programs in which the same test fixture was utilized (for example, Brinkley *et al.*, 1981). A drop height of 5.5 feet corresponded to a 6 G impact, a drop height of 8.5 feet corresponded to an 8 G impact, and a drop height of 11.0 feet corresponded to a 10 G experimental level exposure. Determination of the seat vertical adjustment for each subject was accomplished in a preceding test program (Hearon *et al.*, 1982b).

The specific parameters for each test were provided to the test conductor and other personnel at the beginning of each day of testing. The conduct of all human exposures was the responsibility of a qualified and experienced test conductor. The test conductor directed the activities of all other personnel in the test area in accordance with a detailed checklist.

The first test of each day was done with an anthropomorphic dummy using the equipment configuration and test level planned for the first human test of the day. If no abnormalities were detected, the test personnel proceeded with preparations for tests with volunteer subjects. High speed motion picture cameras were loaded and mounted on the test fixture. Seat vertical and footrest adjustments were made to obtain the appropriate seat configuration based upon the test plan and the anthropometry of the individual test subject. Video recording equipment was readied to permit immediate review of the test by the investigators. The accelerometer packages were then oriented in their respective reference planes and reference zero values were sampled using the data acquisition system.

Subject preparation was concurrent with preparation of the test fixture and instrumentation. Prior to every impact exposure, each subject provided a brief interval medical history and was physically examined. Emphasis was placed on neck or back symptoms, medications, abnormalities of recent sleep patterns, or recent overindulgence in food or alcoholic beverages. No subject was exposed with symptoms which may have obscured detection of test-related injury or which may have indicated predisposition to such injury.

All subjects wore orange, cut-off, long underwear to allow mounting of camera targets and instrumentation. Male subjects wore athletic supporters. The female subject wore a bathing suit. Each subject was instructed to void prior to entering the test area.

A disposable dental bite block (made of Optosil placed over a stainless steel frame) was molded for each subject prior to each impact test. An electrically-isolated accelerometer array was then mounted on the metal frame of the bite block. For tests in cell G of the experimental matrix, the metal frame was modified with a metal arm which extended from the subject's mouth to permit the mounting of a photometric target (fiducial). For tests in cells K and L, due to the presence of the oxygen mask, an unmodified frame was utilized so that the entire bite block could be held within the subject's mouth. In these tests, a fiducial was mounted to the oxygen mask to allow estimation of head displacement. (See and compare Figures D-1, D-2, and D-3 in Appendix D.)

The medical instrumentation of each subject was standardized as follows. Three stick-on EKG electrodes were placed on the subject, one on the upper posterior aspect of each arm and a third on the right lateral chest, sixth intercostal space, mid-axillary line. The snap-on lead from each of these electrodes was plugged into a telemetry transmitter, which, in turn, was strapped to the left upper extremity of the subject. Continuous remote transmission of a single-lead EKG to a portable EKG machine located near the VDT was assured prior to each impact. Sitting and standing tracings were obtained immediately pre-impact (and post-impact) and a continuous tracing was obtained during test countdown and impact. Coincident with EKG recording, pretest (and post-test) sitting and standing blood pressure determinations were made for each subject by the medical technician using a sphygmomanometer. These pressures were recorded on the appropriate EKG tracing.

The subject was then fitted with the appropriate size USAF HGU-26/P flight helmet, MBU-5/P oxygen mask, and Nomex flight gloves. After mounting the test fixture platform, the subject was asked to exhale and the chest accelerometer array was secured against his chest with a Velcro strap. The subject was then seated in the proper, upright position and the restraint harness fitted according to the procedure described in the F/FB-111 Technical Order. The shoulder straps were pre-tensioned. Then the subject was briefed on the proper execution of the crossed-arms bracing procedure and was asked to perform the maneuver by crossing his arms in front of his head and grasping the contralateral inertia reel strap. Those not able to perform the crossed-arms brace were tested in the hands-on-knees position.

The inertia reel straps were pretensioned to  $14 \pm 5$  lb and the lap belt straps were pretensioned to  $20 \pm 5$  lb. Stick-on photometric targets were placed on the subject at pre-determined locations and the positions of these targets relative to one another and to targets mounted on the test fixture were measured. Finally, the inertia reel strap angles (relative to a reference horizontal) were measured.

The final pretest activity consisted of documentation of the test configuration by still photographs, measurement of subject blood pressure, evaluation of the electrocardiographic tracing by the medical monitor, and final safety checks of the test equipment and facility by the designated safety monitor. The test carriage was then elevated to an intermediate height while the water brake was filled with water. Finally, the carriage was raised to the specified drop height and the subject was directed to assume the specified upper extremity bracing position. Prior to doing so, the subject was required to adjust his oxygen mask and place his helmet visor in the down and locked position. With the subject properly braced, the test area was cleared, a countdown was initiated, and the carriage was allowed to fall onto the water brake to produce the desired impact.

The subject was provided with a foot switch which was connected to the control system of the VDT in such a way that the carriage could not be released unless the switch was depressed. In this manner, the subject was required to consciously provide his ongoing informed consent throughout the immediate pre-impact period (including the countdown) until carriage release, in order for the test to proceed. After carriage release, of course, it was no longer possible to abort the test.

A physician monitor, who was responsible for assuring subject safety during testing, was present for each test and reserved the right to cancel any test at any time for any reason. Such reasons may have included a recent history of neck or back strain, pretest pre-syncope, pretest arrhythmia, or any other condition of the subject, equipment, or procedure which was deemed by the monitor to place the subject at undue risk. The medical monitor was provided a finger-operated switch similar in function to the subject's switch. It had to be depressed prior to carriage release in order for the test to proceed. Agreement of both the subject and the medical monitor that the test should proceed was thus assured.

During testing, an ambulance crew was alerted and standing by within one-half mile of the test facility. In addition, emergency medical equipment was arranged in the test area for use by the physician monitor in the event of an emergency. This equipment included a defibrillator, oxygen equipment, intubation equipment, IV solutions and equipment, appropriate emergency drugs, back-board, harness cutters, and bandages.

Following the impact exposure, the subject was released from the harness. The physician monitor assured that the subject was uninjured. Post-test blood pressures and EKG (single-lead) were obtained and a brief post-test physical examination was accomplished. The subject was then provided with contacts to obtain later medical care as required or to ask questions relating to his participation. Impact exposures for each subject occurred no more frequently than once in any five-day period to allow time for detection of any occult injury.

Experimental exposures in this test program were not randomized. The G cell tests were conducted as part of a previous F/FB-111 restraint evaluation program, as has been indicated. Therefore, those tests had been accomplished prior to the start of the present study. Those subjects who could not perform the crossed-arms brace were tested in the hands-on-knees condition alone. Subjects who could comply with the procedure were exposed in the K cell and, subsequently, in the L cell of the experimental matrix. There were no deviations from the test plan during this program.

SECTION 4  
TEST RESULTS AND ANALYSIS

A. PRETEST EVALUATION

Subjects were required to satisfactorily perform the crossed-arms bracing maneuver, with the harness pre-tensioned, prior to being exposed in the K cell of the experimental matrix. The "finger grasp" (number of fingers encircling each inertia reel strap) achieved by each subject is indicated in Table 4A. The minimum requirement for bracing compliance was encirclement of both straps by the forefinger and thumb of each hand. This "finger grasp" would be designated "2". Those subjects unable to perform the crossed-arms brace are designated by "0" or "1" and are listed at the top of the table. Subject D-1 was able to "hook" both forefingers behind the inertia reel straps, but could not achieve the minimum encirclement required for a satisfactory grip. He was, therefore, not tested in the K cell. The five other "non-compliers" physically could not grasp both inertia reel straps simultaneously. Those able to comply with the procedure are listed at the bottom of the Table 4A.

Six of eighteen subjects (33%) were unable to perform the crossed-arms brace. A typical "non-complier" is shown unsuccessfully attempting to grasp the inertia reel strap in Figure 13. Of the twelve subjects able to comply with the procedure, seven achieved "three-finger" grasps on the straps and only one subject could grasp the straps with all fingers of both hands. A typical "complier" is shown encircling the inertia reel strap with forefinger, middle finger and thumb in Figure 14.

Correlation of a subject's crossed-arms bracing compliance with his anthropometry was attempted. Utilizing the available anthropometric data for the subject population, an "Arm Length Index" (ALI), the sum of acromion-radiale length, radiale-stylinon length, and hand length, was derived for each subject. The values for each subject are presented in Table 4B in order of increasing magnitude. Note that the subjects with the three smallest values were able to perform the brace and that the subject with the second largest value could not perform the brace. In this sample, therefore, bracing compliance does not appear to be directly correlated with arm length.

However, a "Body Habitus Index" (BHI), the sum of the neck circumference, chest circumference, and flexed bicep circumference, appears to provide somewhat better correlation with bracing compliance. These values for each subject are presented in Table 4C in order of decreasing magnitude. Although the subject with the largest value was able to comply with the crossed-arms technique, all six "non-compliers" are among the nine subjects with the largest BHI values. Nevertheless, bracing compliance does not appear to be uniquely predictable on the basis of this anthropometric index. Ability to perform the crossed-arms brace also does not appear to be correlated with other relevant anthropometric measurements, such as elbow grip length, functional reach (thumb tip), or extended functional reach.

TABLE 4. SUBJECT BRACING COMPLIANCE AND ANTHROPOMETRIC INDICES

	A			B			C		
	Subj	FG	CP	Subj	ALI	CP	Subj	BHI	CP
1	R-3	0	*	G-2	68.2		P-3	188	
2	G-3	0	*	M10	70.7		H-4	183	*
3	H-4	0	*	F-2	72.5		D-1	179	*
4	K-1	0	*	R-3	74.9	*	H-3	177	
5	M-2	0	*	M-2	75.9	*	M-2	173	*
6	D-1	1	*	K-1	76.0	*	F-3	171	
7	F-2	3		H-4	76.2	*	R-3	170	*
8	F-4	3		F-4	76.3		K-1	170	*
9	H-3	3		F-3	76.7		G-3	168	*
10	M10	3		G-3	76.8	*	R-2	166	
11	P-3	3		H-5	78.2		S-3	165	
12	R-2	3		S-3	78.4		M13	164	
13	S-3	3		R-2	78.8		M11	161	
14	F-3	4		M11	79.5		M10	161	
15	G-2	4		M13	81.1		F-4	161	
16	H-5	4		P-3	82.3		F-2	159	
17	M11	4		D-1	83.4	*	H-5	151	
18	M13	5		H-3	86.1		G-2	148	

"CP" indicates "Compliance". Subjects unable to perform the crossed-arms brace are designated by an asterisk.

"FG" indicates "Finger Grasp". The number of fingers encircling each inertia reel strap is indicated in this column.

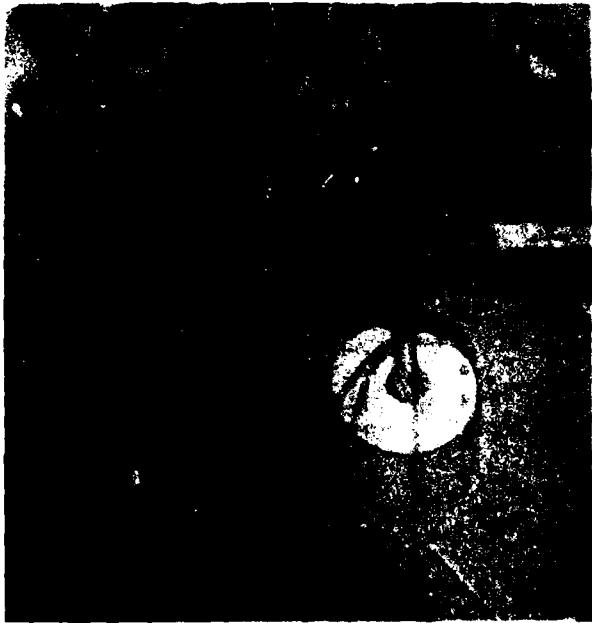
"ALI" is "Arm Length Index", the sum of the acromion-radiale length, radiale-stylium length, and hand length.

"BHI" is "Body Habitus Index", the sum of the neck circumference, chest circumference, and flexed biceps circumference.

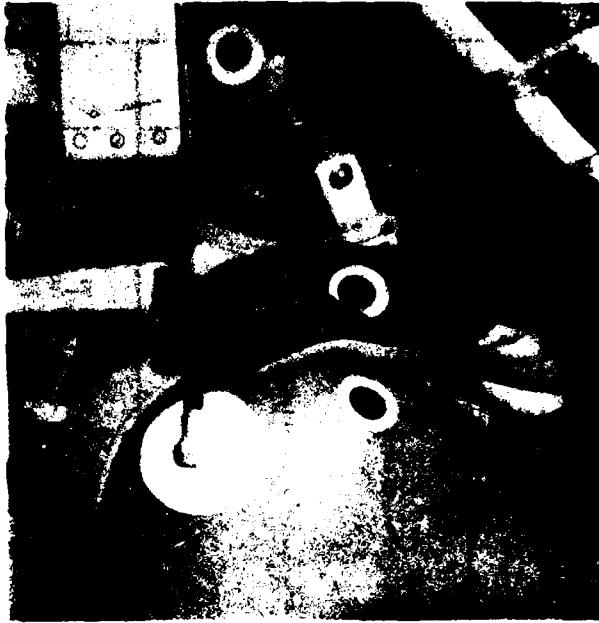
#### B. ELECTRONIC DATA

The electronically measured and computed data obtained during this test program are summarized in Table B-1 in Appendix B. Typical analog data sets from each cell of the experimental matrix and data summaries of each test at the experimental level are also presented in Appendix B.

A statistical analysis of the test results by the Wilcoxon paired-replicate rank test was performed. The means and standard deviations of each parameter in each comparison are summarized in Tables C-1 through C-3 in Appendix C. Statistically significant trends in the measured and computed response parameters for each comparison are summarized in Table 5. The arrow designates a statistically significant change in a parameter at the 90% confidence level for a two-tailed test. The arrow also indicates the direction of the trend from the cell smaller in magnitude. The number indicates the percentage increase in the



Right Hand Reaching for Left Strap



Left Hand Reaching for Right Strap

Figure 13. Typical Crossed-Arms Bracing Non-Complier.



Right Hand Grasping Left Strap



Left Hand Grasping Right Strap

Figure 14. Typical Crossed-Arms Bracing Complier.

parameter mean. Typical Wilcoxon computations from each comparison are also presented in Appendix C.

The first two impacts in the K cell of the experimental matrix were conducted at 6 G (carriage drop height = 5.5 ft) and 8 G (drop height = 8.5 ft). These tests were performed in order to assess human impact response in the crossed-arms position (Figure 6) at relatively low impact levels, since this position had never been evaluated under controlled laboratory conditions. No untoward effects were experienced by the subjects. Tests at the 10 G experimental level were, therefore, initiated.

The impact test conditions were controlled by utilizing the same carriage plunger for all tests and by maintaining a constant drop height of 11.0 ft for all tests done at the experimental level. The means and standard deviations of carriage acceleration, seat acceleration, and carriage velocity change for each cell of the experimental matrix are indicated in Table B-1 (Appendix B). During this test program, the peak carriage acceleration ranged from 10.2 G to 11.0 G, the peak seat acceleration ranged from 10.3 G to 11.5 G, and the carriage velocity change ranged from 24.3 ft/sec to 26.4 ft/sec.

The Wilcoxon analyses revealed statistically significant differences in the peak seat acceleration and the carriage velocity change in comparisons G-K and G-L. (See Table 5.) The differences in seat acceleration represented, at most, a 5% increase and the differences in carriage velocity change represented, at most, a 1% increase. These differences in impact test conditions, attributable to variations in rail friction on the VDT, do not appear to have adversely influenced the trends of the other measured parameters. As indicated below, statistically significant trends of other parameters in the same direction as the increases observed in seat acceleration and carriage velocity change were expected. The statistically significant decreases in still other measured parameters were, therefore, observed in spite of the small but statistically significant increases in seat acceleration and carriage velocity change.

The three bracing conditions investigated in this study were a passive hands-in-lap position (cell G), the currently recommended crossed-arms position (cell K), and an alternate hands-on-knees position (cell L). Components of chest acceleration and the chest Severity Index were increased in the hands-in-lap position compared to either the crossed-arms position or the hands-on-knees position. (See comparisons G-K and G-L in Table 5.) The statistically significant increases in chest acceleration were stronger in the latter comparison, involving both X and Z components as well as the resultant acceleration. However, in the L-K comparison, no statistically significant differences in chest acceleration between the hands-on-knees position and the crossed-arms position were found.

Z component and resultant head acceleration and the head Severity Index were decreased in the crossed-arms position compared to either the hands-in-lap or the hands-on-knees position. In the G-K comparison, there was an average increase in resultant head acceleration of 1.4 G (12%) in the hand-in-lap position. In the K-L comparison, there was an average increase in head acceleration of 0.9 G (10%) in the hands-on-knees position.

TABLE 5

## ELECTRONIC DATA:

SUMMARY OF STATISTICALLY SIGNIFICANT TRENDS FROM THE WILCOXON COMPARISONS  
AND PERCENT INCREASE IN PARAMETER MEANS

MATRIX CELL  
BRACING POSITION

	G Lap (n = 12)	K X-arms	G Lap (n = 17)	L Knees (n = 11)	K X-arms
CARRIAGE ACCELERATION					
CARRIAGE VELOCITY	--->	1	--->	1	
SEAT ACCELERATION	--->	5	--->	4	
CHEST ACCELERATION					
-X axis	107	<---			
+X axis			26	<---	
+Z axis			12	<---	
Resultant			10	<---	
CHEST SEVERITY INDEX	9	<---	17	<---	
HEAD ACCELERATION					
-X axis			61	<---	
+X axis	42	<---			11
+Z axis	14	<---			10
Resultant	12	<---			8
HEAD SEVERITY INDEX	25	<---	13	<---	
STRAP LOADS					
Reflection Straps	--->	63			---> 57
Inertia Reel Straps	--->	165	27	<---	---> 274
Total Shoulder Straps	--->	107	16	<---	---> 155
Total Lap Belt					
Crotch Strap	22	<---			15
SEAT PAN LOADS					49
-X axis					
+Z axis			12	<---	
Resultant			4	<---	
FOOTREST LOADS					
-X axis	10	<---			---> 4
+Z axis	29	<---			---> 5
Resultant	16	<---			46
			35		26
					38
			23		

SEE APPENDIX C

Table C-1

Table C-2

Table C-3

This table summarizes the results of three separate comparisons of electronic data (G-K, G-L, and L-K) by means of the Wilcoxon paired-replicate rank test. The 90% confidence level for a two-tailed test was chosen as the level of statistical significance. An arrow designates a statistically significant trend or change in a parameter mean between two test conditions and also indicates the direction of the trend from the smaller to the larger parameter mean. The number indicates the percentage increase in the parameter means. The actual means used to compute these percentages are listed in Tables C-1, C-2, and C-3 in Appendix C.

The strap load data indicated expected findings in two areas. Individual strap and total shoulder strap loads were increased for the crossed-arms brace compared to either the hands-in-lap or hands-on-knees positions. Also total lap belt and crotch strap loads were increased in the hands-on-knees position compared to either the hands-in-lap or crossed-arms positions.

Seat pan loads were decreased in the hands-on-knees position compared to either the hands-in-lap or the crossed-arms positions. In the hands-in-lap and crossed-arms positions, resultant seat pan loads were increased by, on the average, 80 lb (5%) compared to the hand-on-knees position. (See comparisons G-L and L-K.) In addition, no statistically significant trends in the seat pan loads were found when the hands-in-lap position was compared to the crossed-arms position (G-K comparison).

Footrest loads in comparisons G-L and L-K were increased in the hands-on-knees position compared to either the hands-in-lap or crossed-arms positions. In the G-L comparison, the resultant footrest load in the hands-on-knees position was increased by, on the average, 131 lb (23%) compared to the hands-in-lap position. In the L-K comparison, the resultant footrest load in the hand-on-knees position was increased by, on the average, 195 lb (38%) compared to the crossed-arms position. There were also statistically significant findings in the G-K comparison, in which the footrest loads were increased in the hands-in-lap position compared to the crossed-arms position. In that comparison, the resultant footrest loads in the hands-in-lap position were increased by, on the average, 81 lb (16%) compared to the crossed-arms position.

The best assessment of vertebral column loading during human impact tests remains an evaluation of seat pan loads. In the present study, in both comparisons involving the hands-on-knees position, statistically significant decreases in seat pan reaction loads are accompanied by statistically significant increases in lap belt loads and footrest reaction loads. These tandem findings indicate that, in the L cell, a greater proportion of the load is carried through the extremities to the footrest (and lap belt) than in either the G cell or K cell.

The small but statistically significant increases in head acceleration and head Severity Index in the hands-on-knees position compared to the crossed-arms position (L-K comparison) do not significantly mitigate the decreases observed in seat reaction loads. The absence of statistically significant trends in the chest acceleration components and chest Severity Index in this comparison appears to indicate that the torso is equally well stabilized in the hands-on-knees and crossed-arms positions.

The evaluation in the G-L comparison was accomplished previously in a proposed, modified F/FB-111 crew seat and restraint system (Brinkley *et al.*, 1982). In that study, the seat and footrest findings were comparable to the findings in this study. However, the acceleration and strap load findings were not comparable in all respects. The differences between these two sets of findings may be attributable to the difference in harness geometry between the modified and operational F/FB-111 harnesses.

The observed correlations in the electronic data are summarized in Table 5. Further discussion of the test results and the implications of these results is presented in Section 5B.

### C. PHOTOMETRIC DATA

The lateral photometric data obtained in this test series were processed to obtain the displacement-time, velocity-time, and acceleration-time histories of various photometric targets. In addition, the X-Z trajectories of these targets were analyzed. These data were utilized to (1) measure subject head displacement during the impact, (2) demonstrate subject-specificity in the X-Z trajectories of the photometric targets, and (3) verify subject headstrikes suggested by the electronic data. Typical photometric data obtained in this test program are presented in Appendix D.

Maximum subject head displacements (X component and Z component) were obtainable for the majority of the tests in this series. These displacements were obtained by tracking a helmet-mounted fiducial during the impact. A fiducial mounted on the oxygen mask for tests in cells L and K was also tracked during these tests to provide additional head displacement data. The locations of these fiducials are shown in Figures D-1, D-2, and D-3 in Appendix D. Maximum head displacement data could not be obtained for all tests in this series due to difficulties encountered tracking fiducials during photometric data processing. Problems in this area were related to the photometric targets becoming obscured by a portion of the test fixture or being "washed out" by the lighting in the impact area.

Wilcoxon analyses of the maximum horizontal (X) and maximum vertical (Z) head displacements obtained at comparable target locations in comparable tests were performed. The results of these analyses are shown in Table 6. There were statistically significant increases (29% and 27%, respectively) in maximum vertical head displacement in the hands-in-lap condition compared to either the hands-on-knees position or the crossed-arms position. (See comparisons G-K and G-L.) However, no statistically significant differences in head displacement were seen in either L-K comparison (one based on the displacement of a helmet-mounted fiducial and the other based on the displacement of a fiducial mounted on the oxygen mask). Therefore, from the standpoint of head displacement alone, the crossed-arms brace and the hands-on-knees brace appear to perform equally well and either is superior to the hands-in-lap position.

TABLE 6

## PHOTOMETRIC DATA:

SUMMARY OF STATISTICALLY SIGNIFICANT TRENDS FROM THE WILCOXON COMPARISONS  
AND PERCENT INCREASE IN PARAMETER MEANS

MATRIX CELL  
BRACING POSITION  
MAX HEAD DISPLACEMENT  
(Helmet Fiducial)  
X axis  
Z axis  
MAX HEAD DISPLACEMENT  
(Oxygen Mask Fiducial)  
X axis  
Z axis

G	K	L	K
Lap	X-arms	Lap	Knees
	(n = 7)		(n = 8)
	←--- 27		←--- 29
			(n = 11)
			(n = 9)

This table summarizes the results of three separate comparisons of photometric data (G-K, G-L, and L-K) by means of the Wilcoxon paired-replicate rank test. The 90% confidence level for a two-tailed test was chosen as the level of statistical significance. An arrow designates a statistically significant trend or change in a parameter between two test conditions and also indicates the direction of the trend from the smaller to the larger parameter mean. The number indicates the percentage increase in the parameter means.

## D. MEDICAL FINDINGS

The findings of 50 human impact tests are presented in this report. Nineteen of these exposures were at the 10 G level in the G cell of the experimental matrix and were originally conducted as part of another test program (Hearon *et al.*, 1982b). Two of the tests were preliminary exposures, conducted below the 10 G experimental level. Noteworthy medical findings were annotated immediately following each experiment by the physician medical monitor.

Two subjects incurred petechiae on the lateral neck and another subject incurred a transient paresthesia in the ulnar distribution secondary to experimental exposure. Another subject experienced transient occasional PVC's (premature ventricular contractions) following an impact. Although three subjects complained of a "pulling" sensation in the upper back or shoulder during tests conducted in this study, no muscle strains were attributable to these tests. In addition, no contusions or abrasions were documented. These aforementioned medical findings were considered to be of no clinical consequence. Thus, the test conditions investigated in this program were considered to be well within human tolerance. No subject attrition was experienced during the testing.

## SECTION 5

### DISCUSSION

#### A. REVIEW OF OPERATIONAL EJECTION DATA

Several reviews of the operational F/FB-111 ejection data have been conducted during the last several years. The most recent reviews have provided new insights into this ejection experience. Specifically, most of the vertebral fractures incurred by ejectees occurred during landing impact of the crew module (Hearon *et al.*, 1981) as a result of the severe accelerations imposed during that phase of the escape. In addition, the mechanism of vertebral fracture appears to be one involving axial compression and flexion of the vertebral column (Hearon *et al.*, 1982a).

New insights into the efficacy of the crossed-arms bracing technique for landing impact (Technical Order 1F-111F-1SS-39) have also been obtained. The intended purpose of this brace was to protect the crewmember against vertebral injury by minimizing the forward displacement of the head and torso during landing impact of the crew module. However, a field survey assessing crewmembers' ability to assume the crossed-arms position revealed that 75% of crewmembers had some difficulty attaining the position during training (TWIX from 27th Tactical Fighter Wing at Cannon Air Force Base, New Mexico, 14 April 1980). In addition, during actual ejections, not all crewmembers have been able to comply with this multi-step, post-ejection bracing procedure. The crewmember technical order compliance data have been summarized in detail elsewhere (Hearon *et al.*, 1981) and are presented here in Table 7. These data include all ejections from 13 October 1975 (the date of technical order implementation) to 26 March 1980. A "full" T.O. complier was a crewmember who definitely or probably complied fully with all aspects of the bracing procedure. (See Section 1A.) "Partial" compliers included those crewmembers who utilized the crossed-arms brace, but did not comply with some other aspect of the bracing technique such as, for example, adjusting the seat pan forward.

TABLE 7. T.O. 1F-111F-1SS-39 COMPLIANCE DATA

	POST-T.O.	T.O. COMPLIANCE		
		FULL	PARTIAL	NONE
Survived Ejectees	36	18	6	12
No Vertebral Fracture	24	11	4	9
Vertebral Fracture	12	7	2	3
Retraction-Ejection	6	3	1	2
Landing Impact	3	2	1	0
Unknown Cause	3	2	0	1

Several observations regarding these data are noteworthy. For example, the rate of full compliance in this sample was 50%. Factors adversely influencing crewmember compliance included insufficient time to comply and physical difficulty in complying. In one ejection, for instance, the combination of these two factors resulted in one crewmember attempting to cross his arms and the other crewmember attempting to adjust his seat pan during landing impact.

- Neither crewmember was braced at the time of the impact. In other cases, physical difficulty in complying resulted in the crewmember grasping the headrest and attempting to "pinch" his helmeted head between his elbows (Hearon, 1981). In addition, it is noteworthy that all three of the ejectees whose injuries definitely occurred during landing impact were full or partial compliers and two of the three ejectees who may have been injured during landing impact ("Unknown Cause") were full compliers.

A valid assessment of the efficacy of the crossed-arms bracing technique must consider the vertebral fracture statistics before and after the technique was implemented, regardless of crewmember compliance. Such an evaluation, in the form of a Yates Chi square analysis of appropriate contingency tables, has been performed and is presented elsewhere (Hearon *et al.*, 1982a). That study could not demonstrate that the crossed-arms bracing procedure has been effective in modifying either the rate of vertebral fracture on landing impact or the overall rate of vertebral fracture.

#### B. IMPLICATIONS OF TEST RESULTS

Thirty-three percent (six of eighteen) of the subjects in this study physically could not cross their arms and grasp the contralateral inertia reel straps as recommended in Technical Order 1F-111F-1SS-39. In the operational setting, assuming properly functioning inertia reels, compliance with the technical order in this population would be expected to be slightly worse, due to the presence of flight clothing and the lack of time to comply in high-speed, low-altitude ejections. This experimental experience is consistent with the operational experience summarized in Section 5A and with various reports from the field, which have indicated compliance difficulties during emergency egress training exercises. This represents one of the most serious limitations of the crossed-arms position - not all crewmembers are physically able to comply with the procedure.

The most significant experimental finding among the electronic data was the statistically significant decrease in seat pan load observed in the hands-on-knees position compared to either the hands-in-lap position or the crossed-arms position. This finding, in tandem with a statistically significant increase in footrest load, is consistent with the intended purpose of the hands-on-knees brace, i.e., to unload the vertebral column and to carry a greater proportion of the load through the extremities by creating additional pathways to carry loads from the upper torso to the crew module structure.

The importance of this finding is enhanced by the realization that axial loading (resulting in flexion) is the mechanism by which these vertebral fractures are produced. Vertebral column loading in the present study is reflected by resultant seat pan load, the largest component of which is in the axial or Z direction. The significance of the finding is further enhanced by recognition of the relatively high vertebral injury rate (29.5%) experienced in this escape system operationally. When the injury rate associated with any mechanical force environment is high, a reasonably safe presumption is that subclinical vertebral injuries or near-injuries, in addition to those diagnosed vertebral fractures, are also occurring. It is also conceivable that some crewmembers with minimal vertebral fractures may have averted an injury, if the vertebral column loading

during landing impact was slightly less. The modest improvement in impact protection demonstrated by utilizing the hands-on-knees position experimentally, therefore, suggests that operational use of this brace may result in a decrease in the injury rate.

In addition to being a biomechanically reasonable bracing technique theoretically, use of the hands-on-knees position has a number of advantages. First, there was 100% compliance with the technique in the subject sample. Second, the position may be easily and quickly assumed. Third, the technique has been experimentally demonstrated to carry a greater proportion of the load through the extremities, thus, unloading the vertebral column relative to other techniques. Finally, experience with this technique in human impact experiments has been encouraging. Two-hundred-and-thirty-two (232) human tests in all three cardinal axes have been conducted and no untoward effects specifically related to use of the hands-on-knees position have been documented (Brinkley *et al.*, 1981, 1982; Hearon *et al.*, 1982b). An anterior cruciate ligament injury was incurred by a subject during an 8 G lateral exposure, but this injury was attributed to extraordinary subject anthropometry and extraordinary leg bracing during the impact. It was found to be unrelated to upper extremity bracing (Brinkley *et al.*, 1981).

The disadvantages of utilizing the hands-on-knees bracing technique operationally are primarily related to the potential for arm injuries as a result of upper extremity flailing during landing impact. This is particularly true during lateral impacts, as demonstrated during the initial F/FB-111 test program (Brinkley *et al.*, 1981). The multi-axial accelerations experienced in the crew module are certainly sufficient to cause such extremity flailing. However, soft tissue injuries such as upper extremity contusions and costosternal separations have occurred with use of the crossed-arms brace and, in fact, some of these injuries have been attributed to use of the brace (Hearon, 1981). In the hands-on-knees position, the likelihood of arm flailing may be decreased without altering the load-carrying capability of the arms by firmly grasping the anterior thighs or knees.

Also, the small but statistically significant increase in resultant head acceleration (and the associated increase in head Severity Index) in the hands-on-knees position compared to the crossed-arms position must be considered. However, this increase in head acceleration would not appear to be a significant problem, since head accelerations well in excess of those reported in this study have been tolerated in other human impact tests with little difficulty (Brinkley *et al.*, 1977; Carter, 1959; Lombard *et al.*, 1951).

The limitations of the impact tests reported herein should be noted. All tests were conducted in the same seat adjustment configuration in the operational F/FB-111 crew seat and restraint. As previously indicated, the 90° seat back angle position was selected, since human impact response during vertical accelerations with the seat back upright is known to be more severe than with the seat back reclined. Also, the impact response does not appear to be significantly affected by seat vertical adjustment.

A further limitation of the test program was that non-cardinal axis testing was not conducted. The response to vertical impact accelerations was first investigated because the largest component of module acceleration during landing impact is in the Z direction. Thus, the experiments were comparable to the operational situation in which a "flat" landing of the crew module occurs in an environment with zero wind velocity. As a result of the evaluation presented in this report, there appears to be no reason to pursue multi-axis tests of the crossed-arms position. This is true particularly since a number of subjects physically could not perform the crossed-arms brace.

On the basis of the preceding test results and discussion, it is recommended that the crossed-arms bracing position be abandoned. It is further recommended that the alternate hands-on-knees position be adopted for use by F/FB-111 ejectionees.

SECTION 6  
SUMMARY

A. PROGRAM OBJECTIVES

This test program was designed to achieve the following objectives (Section 1B).

1. Correlate subject anthropometry with ability to comply with the crossed-arms bracing technique.
2. Evaluate and compare human responses in the crossed-arms position to responses in both the hands-on-knees position and the hands-in-lap position during vertical impact accelerations.
3. Obtain human impact data for use in the development of current and future mathematical models intended to predict human inertial response to impact.

B. TEST PROGRAM

1. The experiment was designed to elucidate the effects of upper extremity bracing techniques. The 90° seat back angle position in the full-down or near full-down seat adjustment was investigated (Section 2A).
2. The Vertical Deceleration Tower (VDT) was utilized to provide an experimental +G<sub>Z</sub> impact level of 10 G with an impact velocity of 26 ft/sec (Section 3A).
3. The operational crew seat and restraint harness used in the test program was salvaged from an F/FB-111 crew module. Instrumentation was provided by AFAMRL (Sections 3B and 3C).
4. Human volunteer subjects were medically qualified and utilized in accordance with applicable human use regulations (Section 3D).
5. Relevant accelerations, forces, and loads were measured electronically. Appropriate physiological data were obtained. Subject motion was documented by high speed cameras (Sections 3C, 3D, and 3E).
6. Fifty human impact tests were conducted. Nineteen of these tests were performed during a previous test program (Hearon *et al.*, 1982b). (See Sections 3D and 3E).
7. The Wilcoxon paired-replicate rank test was utilized in data analysis to establish the statistical significance of test results (Section 2B).

### C. TEST RESULTS

1. All accelerations, forces, and loads measured in these test conditions were considered to be well within human tolerance (Section 4D).
2. Thirty-three percent (six of eighteen) of the subjects physically could not perform the crossed-arms bracing maneuver. Ability to assume the crossed-arms position could not be uniquely correlated with subject anthropometry (Section 4B).
3. Seat pan loads were significantly less in the hands-on-knees position than in either the hands-in-lap position or the crossed-arms position. These findings were associated with statistically significant increases in lap belt loads and footrest loads in the hands-on-knees position compared to the other positions. There was no significant difference in seat pan loads when the crossed-arms position was compared to the hands-in-lap position (Section 4B).
4. There were small but statistically significant increases in resultant head acceleration and head Severity Index in the hands-on-knees position compared to the crossed-arms position (Section 4B).
5. There was no significant difference in maximum head displacement in the crossed-arms position compared to the hands-on-knees position (Section 4C).

### D. RECOMMENDATIONS

1. Further human impact tests of the crossed-arms bracing position are not recommended (Section 5B).
2. The crossed-arms bracing maneuver recommended in Technical Order 1F-111F-1SS-39 should be abandoned (Section 5B).
3. The hands-on-knees bracing position described herein is recommended for use by F/FB-111 ejectees (Section 5B).

APPENDIX A  
DATA ACQUISITION EQUIPMENT AND METHODS

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INTRODUCTION

Under Contract F33615-79-C-0523, Dynalectron was requested by the Air Force Aerospace Medical Research Laboratory/Biomechanical Protection Branch to instrument a test fixture fabricated by General Dynamics Corporation and to collect data in a test program designed to evaluate the efficacy of upper extremity bracing positions. The testing was conducted in one axis of acceleration on the Vertical Deceleration Tower Test Facility located at the Air Force Aerospace Medical Research Laboratory, Building 824, Area B, Wright-Patterson Air Force Base. The following is a discussion of the equipment and techniques used in acquiring and processing data that describe the kinematic and inertial responses of the human body. Installation and sensor specifications are also included in the discussion.

## DATA MEASUREMENT DEVICES

This evaluation program was instrumented using thirty-seven transducers. The Digital Instrumentation Requirements sheets of Figures A-1 through A-3 contain the pertinent data for each channel.

### SUBJECT INSTRUMENTATION

Each subject was instrumented with six accelerometers. These accelerometers were configured in groups of three to create two triaxial measuring packages. Each package was mounted to indicate accelerations in the X, Y and Z axes. Figure A-4 shows the coordinate system utilized and the corresponding output polarity for an applied acceleration.

The accelerometer package used to measure head accelerations was designed to be inserted into the subject's mouth. It consisted of three Endevco accelerometers, Model 2264-200, mounted to a plastic block with dimensions of 7/16 x 7/16 x 7/16 inches. This assembly was covered with a medical grade silicone rubber sealant to provide electrical isolation. The three accelerometer cables were routed to one end of the block. Next, a dental bracket that had been custom fitted to the subject's mouth was mounted to the block. The approximate weight of the completed package was 50 grams. When the dummy subject was used the dental bracket was removed and the package was mounted to a bracket at the approximate center of the dummy's head. Specifications for the accelerometers used in this package are shown in Figure A-5.

The accelerometer package used to measure chest accelerations was designed to be attached externally to the subject's chest. It consisted of three Endevco accelerometers, Model 2264-150, mounted to an aluminum block that measured approximately 5/8 x 5/8 x 3/4 inches. This

assembly was inserted into an aluminum protection shield that was attached to a length of Velcro fastener strap. In use, the completed package was placed over the subject's sternum while the Velcro strap was wrapped around the subject and fastened. Specifications for the accelerometers used in this package are shown in Figure A-6.

#### HARNESS INSTRUMENTATION

During the evaluation program, all tests were conducted with the operational F-111 crew seat and restraint system. The seat and operational harness are shown in Figure A-7. The test fixture is shown in Figure 11 of the body of this report. The output polarity of each load cell corresponds to an applied load in accordance with the coordinate system shown in Figure A-8.

A total of seven load cells were used to instrument the F-111 harness. Two of the transducers used were Lebow automotive belt load cells, Model 3419. These load cells monitored the load applied to the left and right inertia reel straps. Specifications for these load cells are shown in Figure A-9.

The five remaining load cells utilized the restraint harness hardware. Four 350 ohm resistive strain gages were bonded to each piece of harness hardware and wired in a bridge configuration. Figure A-10 shows the strain gage placement and wiring diagram. Figure A-7 shows the two reflection straps and Figure A-11 shows the lap and crotch strap units.

#### SEAT PAN INSTRUMENTATION

The seat pan instrumentation measured both acceleration and load. The acceleration measurements were performed using three Endevco accelerometers, Model 2264-200. The accelerometers were mounted to a plastic block, 3/4 x 1 x 1 inch, to form a triaxial package. This package was secured to the seat pan assembly to indicate accelerations in the X, Y and Z axes as shown in Figure A-12. Figure A-4 shows the coordinate system utilized and the corresponding output polarity for an applied acceleration. Figure A-5 shows the specifications for the accelerometers used in this package.

The load measurements were made utilizing two types of load cells to fit the physical size limitations of the seat pan. Z-axis load measurements were taken using three Strainsert Flat Load Cells, Model FL2.5U-2SKPT. These cells were used in a three point mounting configuration as shown in Figure A-12. Specifications for these load cells are shown in Figure A-13. The X-axis and Y-axis loads were measured using load links specifically designed for this application by General Dynamics. These load links were instrumented with resistive strain gages as shown in Figure A-14. Each load link had four resistive arms with 2 arms active. Each end of the load links housed a swivel ball to eliminate cross-axis load effects on the measurements. The output polarity of each load cell corresponds to an applied load in accordance with the coordinate system shown in Figure A-8.

#### FOOT REST INSTRUMENTATION

The foot rest assembly, as shown in Figure A-15, was instrumented using three GSE load cells, Model T-10952C. These triaxial load cells were capable of measuring 2500 lb in the Z-axis and 500 lb in both the X and Y-axes. Figure A-16 illustrates the location and orientation of these load cells. The output polarity of each load cell corresponds to an applied load in accordance with the coordinate system shown in Figure A-8.

#### CARRIAGE INSTRUMENTATION

For acceleration measurements the carriage was instrumented with a triaxial accelerometer package. This package consisted of three accelerometers mounted to a 3/4 x 1 x 1 inch block. The accelerometers used were all Endevco transducers with the following Model numbers and axis measurements; 2262A-200 for Z-axis, 2264-200 for X-axis and 2264-150 for Y-axis. Specifications for these accelerometers are shown in Figures A-17, A-5 and A-6 respectively. This package was securely mounted to the underside of the carriage. Figure A-4 shows the coordinate system utilized and the corresponding output polarity for an applied acceleration.

Carriage velocity measurements were obtained by means of a velocity wheel running against the rail. This unit consisted of a Globe

Industries tachometer, Model 22A672, and a wheel mounted on its shaft. The wheel was aluminum with a rubber "O"-ring around the circumference. To insure continuous rail contact the wheel assembly was spring loaded against the rail. The wheel was calibrated to output voltage as a function of velocity.

#### CALIBRATION

Straininsert Load Cells were calibrated on a periodic basis at the Precision Measurement Equipment Laboratories (PMEL), Wright-Patterson Air Force Base. The PMEL returns each device with a certificate providing current sensitivity and linearity data. Factory calibration data for the GSE Triaxial Load Cells were used for this evaluation program.

All accelerometers, load links, Lebow belt load cells and harness hardware load cells were calibrated at the AFAMRL/BBP Laboratory, Wright-Patterson Air Force Base. These calibrations were performed prior to (pre) and upon completion of (post) the evaluation program. The calibration data is shown in Figures A-18 and A-19.

Accelerometers were calibrated by using the reciprocity method to determine accelerometer frequency and phase characteristics as well as sensitivity. This method utilized a shaker table to which a "standard" accelerometer and the accelerometer to be calibrated were mounted. This "standard" accelerometer is calibrated yearly to standards traceable to the National Bureau of Standards. The sensitivity was determined by comparing the outputs of the standard and test accelerometer at 100Hz and 40G. The frequency and phase response was determined by driving the shaker table with a random noise generator and analyzing the output data by Fourier Analysis via the PDP 11/15 and Time Data unit. The natural frequency and the dampening factor of the test accelerometer were both determined from this information.

The load cells mentioned previously in this section were all calibrated on a special test fixture. The sensitivity and linearity of each load cell were obtained by comparing its output with the output of a "standard" load cell output placed under an identical tension load. This "standard" load cell is calibrated on a yearly basis by standards

traceable to the National Bureau of Standards.

#### SEAT GEOMETRY

The seat geometry drawings in Figure A-20 and A-21 show the polarity of the various output signals. Included in the drawings are the location dimensions for each fixed load cell and the variables introduced by the seat height and seat pan adjustment.

PROGRAM		DIGITAL INSTRUMENTATION REQUIREMENTS							DATE 26 Nov 80		THRU 17 Dec 80	
Bracing Position Study									RUN 529		TMU 564	
FACILITY		Vertical Deceleration Tower										
DATA CHANNEL	DATA POINT	INDUCER TYPE	S/N	INDUCER SENS.	EXCITE V CHAN	FILTER CIRCUITS	AMP GAIN	SAMPLE RATE	FILTER HZ	INDUCER ZERO RANGE	BRIDGE BALANCE RESISTORS	BRIDGE COMPLETION RESISTORS
1	Carriage 2	Endevco 2262A-200	FR42	4.161 mV/g	10.00	60	25	1K	120	2.50 +5.0 -0.0	-	-
2	Head X	Endevco 2264-200	BP10	2.496 mV/g	"	2	50	21	"	"	680K into Gnd	1.65K
3	Head Y	"	BQ42	2.713 mV/g	"	3	100	"	"	"	"	"
4	Head Z	"	BQ51	2.553 mV/g	"	4	25	10	"	"	"	"
5	Chest X	Endevco 2264-150	BC26	2.786 mV/g	"	5	50	"	"	"	250K into Gnd	"
6	Chest Y	"	BB13	2.430 mV/g	"	6	100	5	"	"	"	"
7	Chest Z	"	2A20	2.619 mV/g	"	7	25	"	"	"	"	"
8	Left Lap EAD6-125 BZ-350	MicroMaus	15.10 uV/1b	"	8	8	20	"	10.299	"	"	220K into Gnd
9	Right Lap	"	13.16	"	7	7	"	"	"	"	"	155K into Gnd
10	4-S strap	"	14	uV/1b	9	9	20	"	38.189	"	"	"
11	Left Seat Pan	Strainser EAD6-125 BZ-350	1.80 uV/1b	"	10	10	10	"	824 1b	"	"	39.5K into Gnd.
12	Right Seat Pan	"	143377	"	"	800	"	"	"	"	"	"
13	Center Seat Pan	"	3294-4	7.988 uV/1b	"	12	12	10	"	"	"	"
14	Left Reflection Strap	"	3294-6	8.011 uV/1b	"	13	13	3	"	"	"	"
			02-10	26.32 uV/1b	"	100	"	"	1553 1b	"	"	"
			14	14	15	"	"	"	950 1b	"	"	"

Computer Comparator Start @ -3. Off @ +1

14/79

PAGE 1 OF 3

Figure A-1

DIGITAL INSTRUMENTATION REQUIREMENTS										DYNATECTRON CORPORATION			
PROGRAM		Bracing Position Study		DATE		26 Nov 80		THRU		17 Dec 80			
FACILITY		Vertical Deceleration Tower		RUN		529		THRU		564			
DATA CHANNEL	DATA POINT	INSTRUMENT TYPE	S/N	NUMBER OF SENSORS	V	FACETE SERIES	AMP GAIN	SAMPLE RATE	F.S. SENS	FILTER Hz	REDUCER ZERO RANGE	SWING BALANCE RESISTORS	SPECIAL NOTATIONS
15	Right MicroStrain	MicroStrain ADG-125	01-3	34,04	10.00	1K	100	1K	1	734 lb	120	2.50 +5.0 -0.0	20K into Gnd.
	Reflected Light	MicroStrain ADG-125	02-350	uv/lb									
16	Left Inertia	MicroStrain ADG-3.5K	363	7.86	"	16	16	8	"	791 lb	"	"	"
17	Right Inertia	MicroStrain ADG-3.5K	364	7.54	"	17	17	4	"	825 lb	"	"	"
18	Left Lead Link	MicroStrain ADG-002	001	10.79	"	18	18	11	"	576 lb	"	"	106K into Gnd.
	Lead Link	MicroStrain ADG-002	-10-350	uv/lb									
19	Right Lead Link	GSF T-10952C	002	10.11	"	19	19	13	"	615 lb	"	"	55K into Gnd.
20	Left Foot Load	GSF T-10952C	001	27.64	"	20	20	22	"	904 lb	"	"	"
21	Left Foot Load Y	GSF T-10952C	001	28.61	"	21	21	24	"	874 lb	"	"	"
22	Left Foot Load Z	GSF T-10952C	001	16.93	"	22	22	14	"	2953 lb	"	"	"
23	Right Foot Load X	GSF T-10952C	002	28.36	"	23	23	6	"	832 lb	"	"	"
24	Right Foot Load Y	GSF T-10952C	002	28.16	"	24	24	19	"	888 lb	"	"	"
25	Right Foot Load Z	GSF T-10952C	002	16.61	"	25	25	19	"	3010 lb	"	"	"
26	Center Foot Load X	GSF T-10952C	003	27.94	"	26	26	25	"	895 lb	"	"	"
27	Center Foot Load Y	GSF T-10952C	003	28.08	"	27	27	16	"	890 lb	"	"	"
28	Center Foot Load Z	GSF T-10952C	003	16.50	"	28	28	16	"	3030 lb	"	"	"

Figure A-2

PROGRAM		DIGITAL INSTRUMENTATION REQUIREMENTS										DATE		
Bracing Position Study		26 Nov 80										17 Dec 80		
Vertical Deceleration Tower		THRU										THRU		
RUN	DATA POINT	ACCELEROMETER MFG & TYPE	S/N	ENCLOSURE SENS	ENCLOSURE V CHAN	FILTER SERIES	AMP GAIN	SAMPLE RATE	FILTER HZ	REDUCER ZERO	BRIDGE BALANCE RESISTORS	BRIDGE COMPLETION RESISTORS	SPECIAL NOTATIONS	
DATA CHANNEL	DATA POINT	ACCELEROMETER MFG & TYPE	S/N	ENCLOSURE SENS	ENCLOSURE V CHAN	FILTER SERIES	AMP GAIN	SAMPLE RATE	F.S.	SENS	BRIDGE BALANCE RESISTORS	BRIDGE COMPLETION RESISTORS	SIGNAL attenuated by 6.242 prior to signal cond. amplifier V/F/Ps negative output-sens+.5019/6.242+.0804	
29	Velocity	Globe 22A672	3	.5019 volts/fps	-	60	1	1	1K	62.26ps	120	5.00 +5.0 -0.0	-	-
31	Carriage Y	Endevco 2264-150	BB11	2.354 mV/g	10.00	29	50	"	"	2.50	"	1M	into Gnd	1.65K
32	Seat X	Endevco 2264-200	BW63	2.564 mV/g	"	31	31	3	"	21.24g	"	"	"	397K into Gnd
33	Seat Y	"	BV41	3.298 mV/g	"	32	50	27	"	19.56g	"	"	"	1.47K into Gnd
34	Seat Z	"	BW63	2.525 mV/g	"	33	50	5	"	15.16g	"	"	"	125K into Gnd
35	Can Load Link Y	MicroMeas EA-06-062 IJ-350	004	10.23 uv/1b	10.23 uv/1b	35	35	5	"	6081b	"	"	"	512K into Gnd
36	Carriage X	Endevco 2264-200	BX49	2.581 mV/b	"	36	50	32	"	17.70g	"	"	"	1.63K into Gnd
38	Seat Pan Z	Entrant EGA-125-1000	A4-4	1.679 mV/g	"	38	30	23	"	29.78g	"	"	"	82K into Gnd
39	Foot Plate Z	"	A5-5	1.617 mV/g	"	39	37	30	"	30.92g	"	"	"	127K into Gnd
47	2.5 Volt Bias	-	-	-	-	47	-	-	"	2.5volt	360	"	"	-
48	10 Volt Exc.	-	-	-	-	180	1	-	"	5 volt	360	0.0	"	-
						48	-	-	"					-

Figure A-3

## ACCELEROMETER COORDINATE SYSTEM

### ACCELERATION

Accelerometers will be oriented and wired to provide an output corresponding to the applied acceleration. Use this table as a reference:

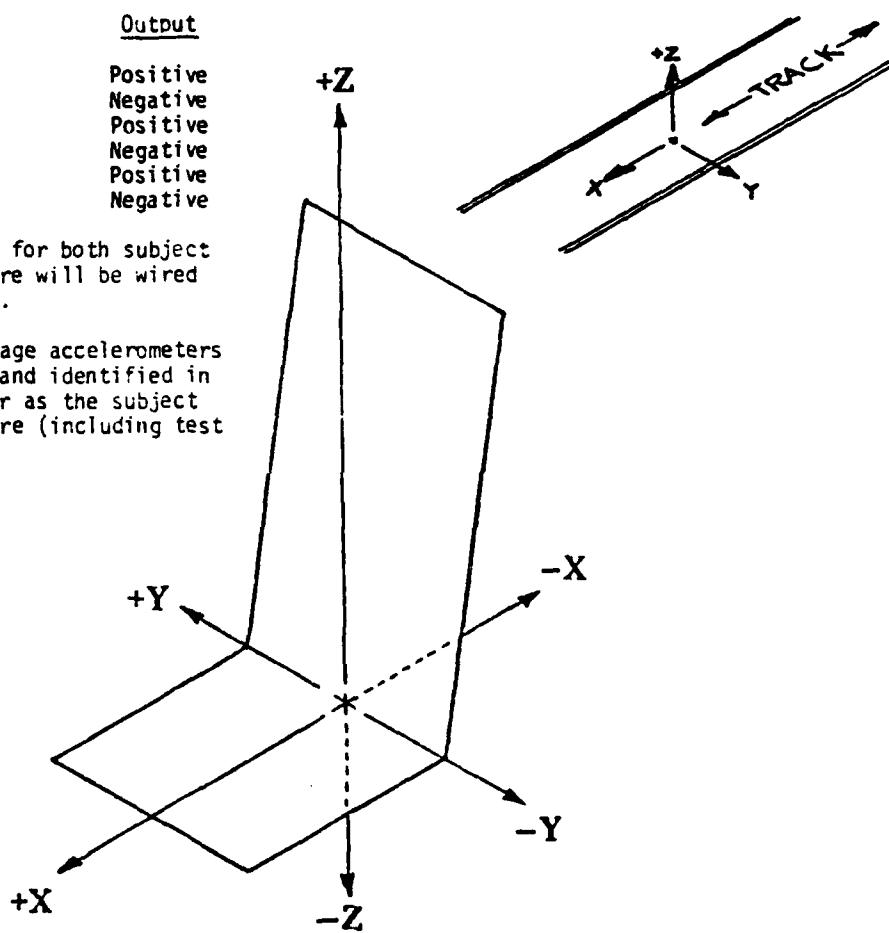
<u>Acceleration</u>	<u>Output</u>
+Gx	Positive
-Gx	Negative
+Gy	Positive
-Gy	Negative
+Gz	Positive
-Gz	Negative

Accelerometers for both subject and test fixture will be wired in this manner.

Sled and carriage accelerometers will be wired and identified in the same manner as the subject and test fixture (including test profiles).

### BARE SLED AND MACHINE TESTS

Accelerometers will be oriented to provide outputs to agree with track coordinate system with polarities as noted in test log.



## AMRL BBP COORDINATE SYSTEM (Left Hand Rule)

Figure A-4

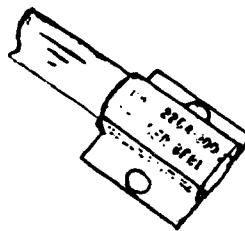
## MODEL 2264-200

$\pm 200$  g  
One gram  
MINIATURE  
PIEZORESISTIVE  
ACCELEROMETER

The Model 2264-200 is a very low mass, piezoresistive accelerometer designed for modal studies, flutter testing and similar applications requiring good low frequency response and minimum mass loading.

With only a small amount of damping, the Model 2264-200 has no phase shift over its useful frequency range of steady state to 1200 Hz. Protection against overranging results from the high environmental rating of  $\pm 1000$  g peak. The accelerometer can be operated over a temperature range of 0°F to 150°F ( $-18^{\circ}\text{C}$  to  $66^{\circ}\text{C}$ ).

The 2264-200 utilizes Piezite® Element Type P-11 gages in a half bridge circuit providing a low impedance nominal output of 500 mV full scale at 10 Volts dc excitation.



### SPECIFICATIONS FOR MODEL 2264-200 ACCELEROMETER

#### DYNAMIC

RANGE	$\pm 200$ g to $\pm 200$ g
SENSITIVITY (at rated excitation)*	2.5 mV/g, nominal; 2.0 mV/g, minimum
MOUNTED RESONANCE FREQUENCY	6700 Hz, nominal
AMPLIFICATION FACTOR, Q	10, maximum, at resonance and 75°F
FREQUENCY RESPONSE: (reference 100 Hz)	$\pm 10\%$ max., 0 to 1200 Hz at +75°F (24°C)
TRANSVERSE SENSITIVITY	3% maximum
LINEARITY AND HYSTERESIS*	$\pm 2\%$ cf reading, maximum, 0 to 150 g; $\pm 2.5\%$ cf reading, maximum, 0 to 200 g.
THERMAL SENSITIVITY SHIFT	$\pm 40$ mV max., at 0°F and 150°F ( $-18^{\circ}\text{C}$ and $66^{\circ}\text{C}$ ), ref. 75°F (24°C)
WARMUP TIME	1 minute

#### ELECTRICAL

EXCITATION*	10.0 V dc
RESISTANCE PER ARM*	1700Ω ± 20%, at $\sim 75^{\circ}\text{F}$ (24°C)
ZERO MEASURAND OUTPUT	50 mV dc max., at $\sim 75^{\circ}\text{F}$
THERMAL ZERO SHIFT	$\pm 40$ mV max., at 0°F and 150°F ( $-18^{\circ}\text{C}$ and $66^{\circ}\text{C}$ )
INSULATION RESISTANCE*	10MΩ minimum at 100 V dc

#### ENVIRONMENTAL

ACCELERATION LIMIT\*  
(in any direction)

Static:  $\pm 1000$  g.  
Sinusoidal:  $\pm 1000$  g pk.  
Shock:  $\pm 1000$  g pk, 1.5 millisecond duration or longer.

CAUTION: Keep protective sleeve on accelerometer until ready to use.

TEMPERATURE

Operating: 0°F to 150°F ( $-18^{\circ}\text{C}$  to  $66^{\circ}\text{C}$ )

HUMIDITY  
ALTITUDE

Non-Operating: -65°F to 200°F (-54°C to 93°C)

Epoxy Sealed  
Not Affected

Figure A-5 - Accelerometer Specifications

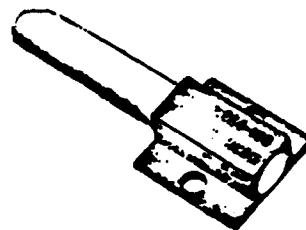
## MODEL 2264-150

$\pm 150 \text{ g}$   
One gram  
MINIATURE  
PIEZORESISTIVE  
ACCELEROMETER

The Model 2264-150 is a very low mass, piezoresistive accelerometer designed for modal studies, flutter testing and similar applications requiring good low frequency response and minimum mass loading.

With only a small amount of damping, the Model 2264-150 has no phase shift over its useful frequency range of steady state to 1200 Hz. Protection against overranging results from the high environmental rating of  $\pm 1000 \text{ g}$  peak. The accelerometer can be operated over a temperature range of  $0^\circ\text{F}$  to  $+150^\circ\text{F}$ .

The 2264-150 utilizes Piezite® Element Type P-11 gauges in a half bridge circuit providing a low impedance nominal output of 373 mV full scale at 10 Volts dc excitation.



TWO TIMES ACTUAL SIZE

### SPECIFICATIONS FOR MODEL 2264-150 ACCELEROMETER (According to ANSI and ISA Standards)

#### DYNAMIC

RANGE	$-200 \text{ g}$ to $+200 \text{ g}$
SENSITIVITY (at rated excitation) <sup>1</sup>	$2.5 \text{ mV/g}$ , nominal; $2.0 \text{ mV/g}$ , minimum
MAINTAINED RESONANCE FREQUENCY	4700 Hz, nominal
AMPLIFICATION FACTOR, Q	10, maximum, at resonance and $75^\circ\text{F}$
FREQUENCY RESPONSE <sup>2</sup> (reference 100 Hz)	$\pm 10\%$ max., 0 to 1200 Hz at $+75^\circ\text{F}$ ( $24^\circ\text{C}$ )
TRANSVERSE SENSITIVITY	$3\%$ maximum
LINEARITY <sup>3</sup>	$\pm 2\%$ of reading, maximum, 0 to $150 \text{ g}$ ; $\pm 2.5\%$ of reading, maximum, 0 to $200 \text{ g}$ .
THERMAL SENSITIVITY SHIFT	$\pm 10\%$ max., at $0^\circ\text{F}$ and $+150^\circ\text{F}$ , ref. $+75^\circ\text{F}$
WARMUP TIME	1 minute

#### ELECTRICAL

EXCITATION <sup>4</sup>	10.0 V dc
RESISTANCE PER AMP	$17000 \Omega \pm 20\%$ , at $+75^\circ\text{F}$ ( $24^\circ\text{C}$ )
ZERO MEASURAND OUTPUT	$\pm 50 \text{ mV}$ dc max., at $+75^\circ\text{F}$
Thermal zero shift	$\pm 50 \text{ mV}$ max., over rated temperature range

INSULATION RESISTANCE<sup>5</sup> .....  $10M \Omega$  minimum at 100 V dc

#### ENVIRONMENTAL

ACCELERATION LIMIT <sup>6</sup>	$\pm 1000 \text{ g}$ pk shock pulse, one millisecond duration or longer. CAUTION: Keep protective sleeve on accelerometer until ready to use.
TEMPERATURE	Operating: $0^\circ\text{F}$ to $150^\circ\text{F}$ ( $-18^\circ\text{C}$ to $66^\circ\text{C}$ ) Non-Operating: $-65^\circ\text{F}$ to $200^\circ\text{F}$ ( $-54^\circ\text{C}$ to $93^\circ\text{C}$ )
HUMIDITY	Epoxy Sealed

Figure A-6 - Accelerometer Specifications

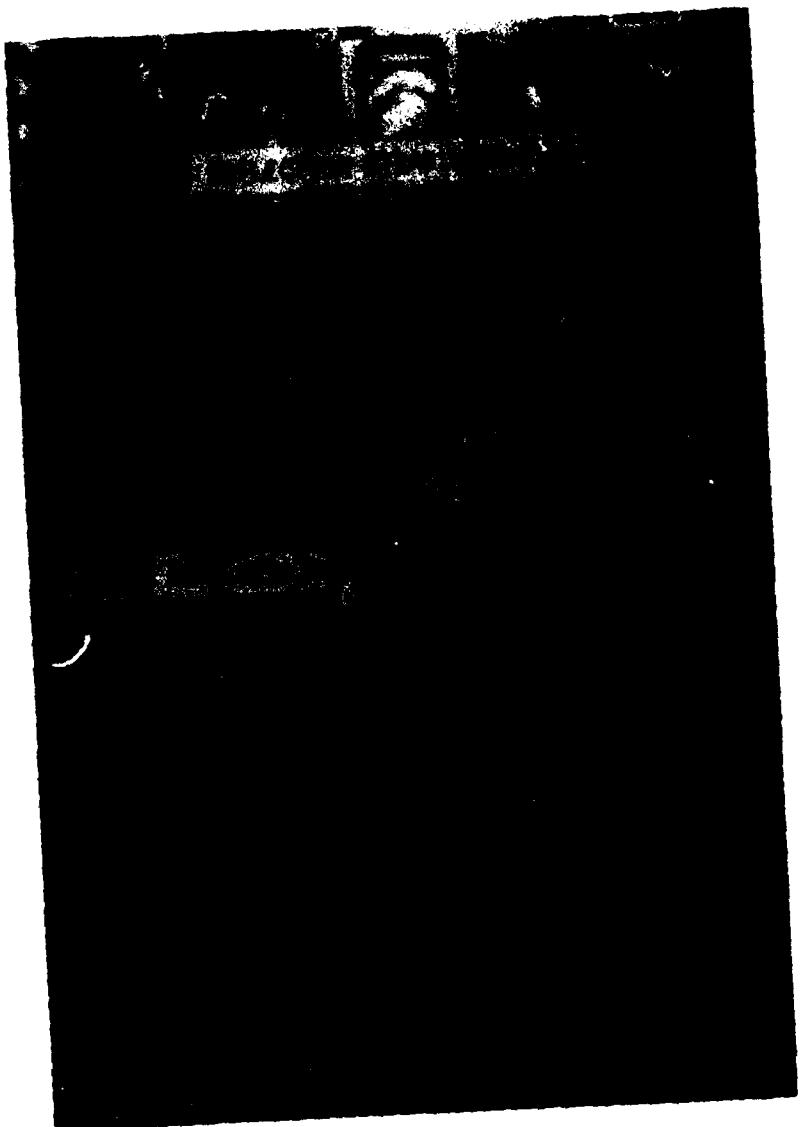
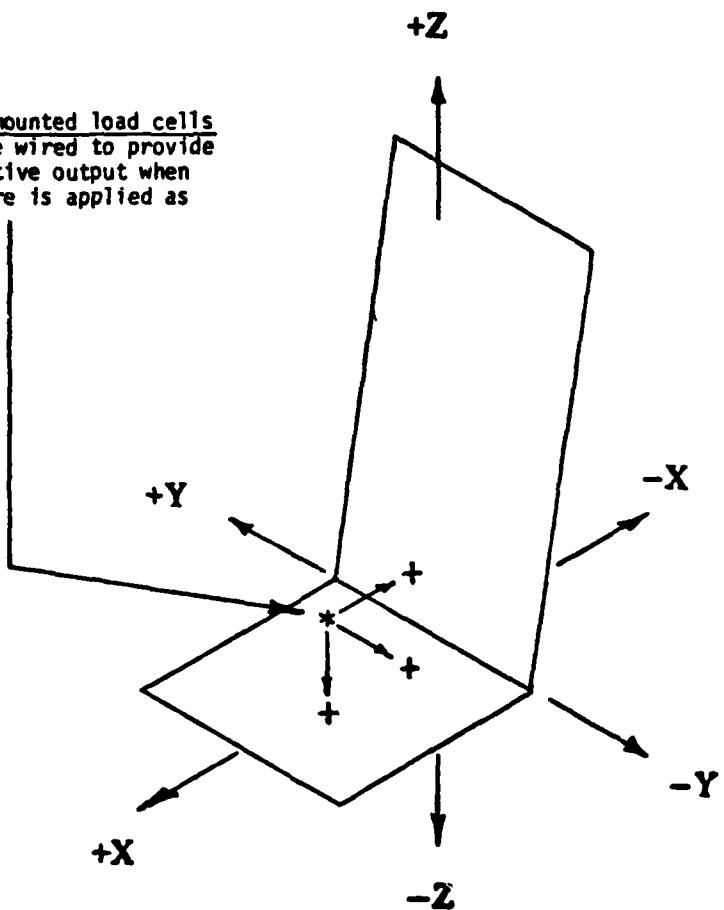


Figure A-7 -- F-111 Crew Seat and Operational Harness

### LOAD CELL COORDINATE SYSTEM

Swivel mount and Lebow belt  
Load cells will be wired to  
provide a positive output  
when the belt is pulled.

Fixed mounted load cells  
will be wired to provide  
a positive output when  
pressure is applied as  
shown.



### AMRL BBP COORDINATE SYSTEM

( Left Hand Rule )

Figure A-8

# AUTOMOTIVE LOAD CELLS

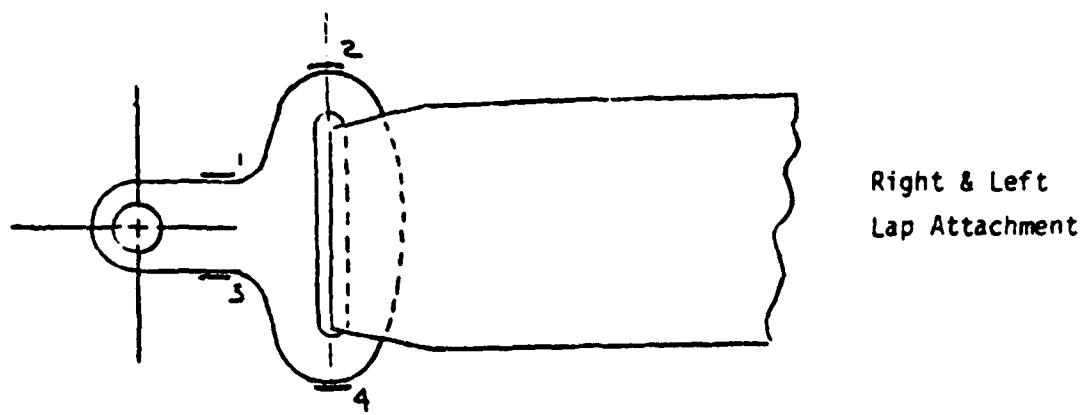


Model 3419  
Capacity Available  
3500 lbs.

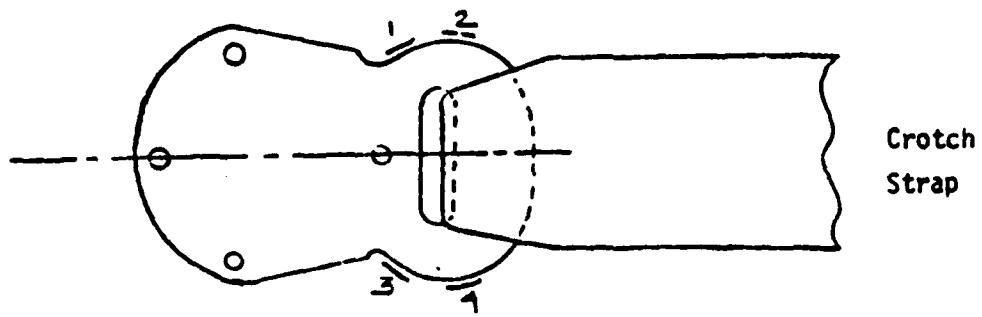
## SPECIFICATIONS

Output at rated capacity: millivolts per volt, nominal	$\pm 2$
Nonlinearity: of rated output	$\pm 2\%$
Hysteresis: of rated output	$\pm 4\%$
Repeatability: of rated output	$\pm 1.0\%$
Zero balance: of rated output	$\pm 2\%$
Bridge resistance: ohms nominal	350
Temperature range, compensated: °F	+30 to +150
Temperature range, useable: °F	-65 to +200
Temperature effect on output: of reading per °F	$\pm 0.003\%$
Temperature effect on zero: of rated output per °F	$\pm 0.003\%$
Overload rating, safe: of rated capacity	150%
Excitation voltage, maximum: volts DC or AC rms	20
Insulation resistance, bridge/case: megohms at 50 VDC	1000
Belt thickness: (maximum) inches	0.10
Belt width: (maximum) inches	2.00
Weight: in ounces	8
Available capacities: pounds	3500

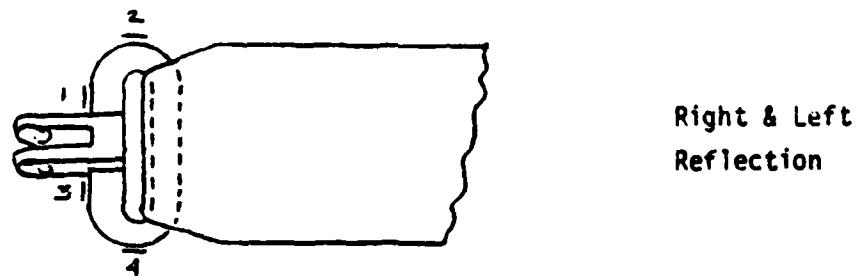
Figure A-9 - LOAD CELL SPECIFICATIONS



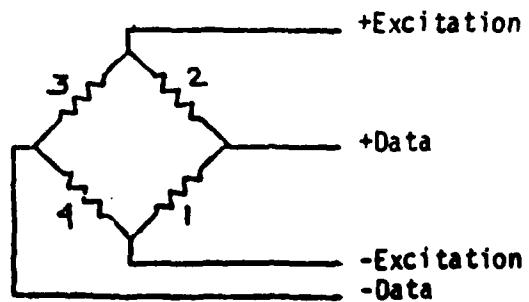
Right & Left  
Lap Attachment



Crotch  
Strap



Right & Left  
Reflection



Notes:  
 \*Strain Gages are Micro-Measurements Model EA-06-125BZ-350  
 \*All units wired identical  
 \*All 4 arms active

Figure A-10- LOAD CELL SPECIFICATIONS (HARNESS HARDWARE)



Figure A-11 - HARNESS INSTRUMENTATION

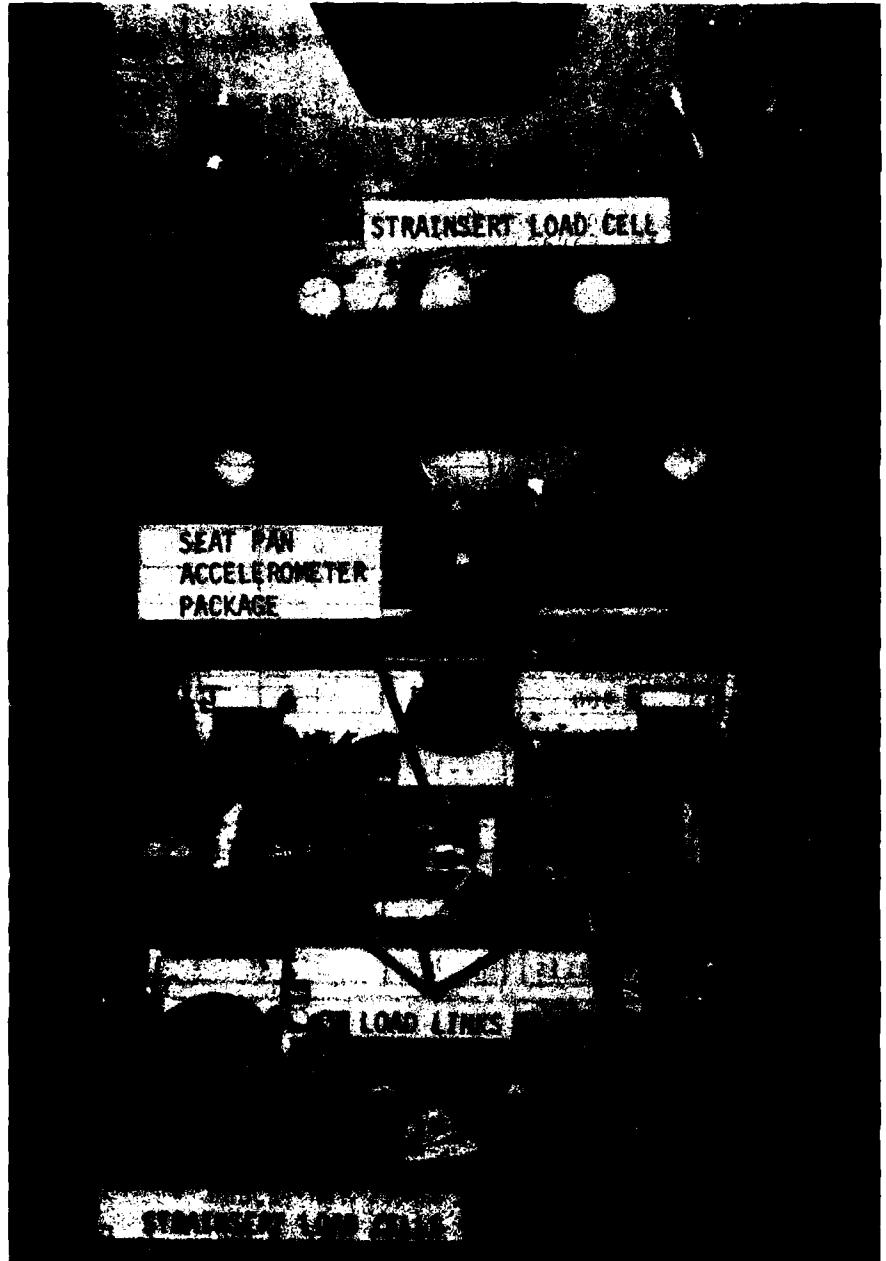


Figure A-12 - SEAT PAN INSTRUMENTATION

**STRAININSERT  
CALIBRATION DATA**

U. S. Air Force  
Wright-Patterson AFB  
Dayton, Ohio

Q-3294  
Straininsert Job No.

Date: 10/16/76

Customer P.O. No. F33-601-76-86950

Sign: CGH

Transducer: Universal Flat Load Cell, Model FL2.5U-2SPKT  
2,500 lb. Capacity, 2 mv/v, 350 Ohms

Gages: EA-06-104ZA-175  
Service Temp.: 150° F Max.  
Calib. Temp.: 73°F

Type: C (Bendix PT02H-10-6P)  
Ins. Res.: Over 10,000 megohms.  
S/N: Q3294-6

Load LBS.	Straight Line Signal Mv/v	Deviation, uv/v			Rep. uv/v
		Run 1	Run 2	Run 3	
0	0	0	0	0	0
500	0.400	-½	0	0	½
1,000	0.800	+½	+½	+½	0
1,500	1.200	0	0	0	0
2,000	1.600	-1	-1	-1	0
2,500	2.000	-½	-½	-½	0
2,000	1.600	-1	-½	-½	½
1,500	1.200	+1	+1	+1	0
1,000	0.800	+1½	+1½	+1½	0
500	0.400	+½	+1	+1	½
0	0	0	0	0	0
<b>Hysteresis</b>		1	1	1	

Calibration Analysis:

Non-Linearity: 1 parts in 2,000 = .05%

Repetition

Loading : ½ parts in 2,000 = .03%

Unloading: ½ parts in 2,000 = .03%

Zero Load: 0 parts in 2,000 = --

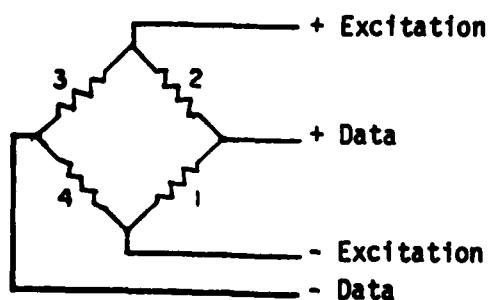
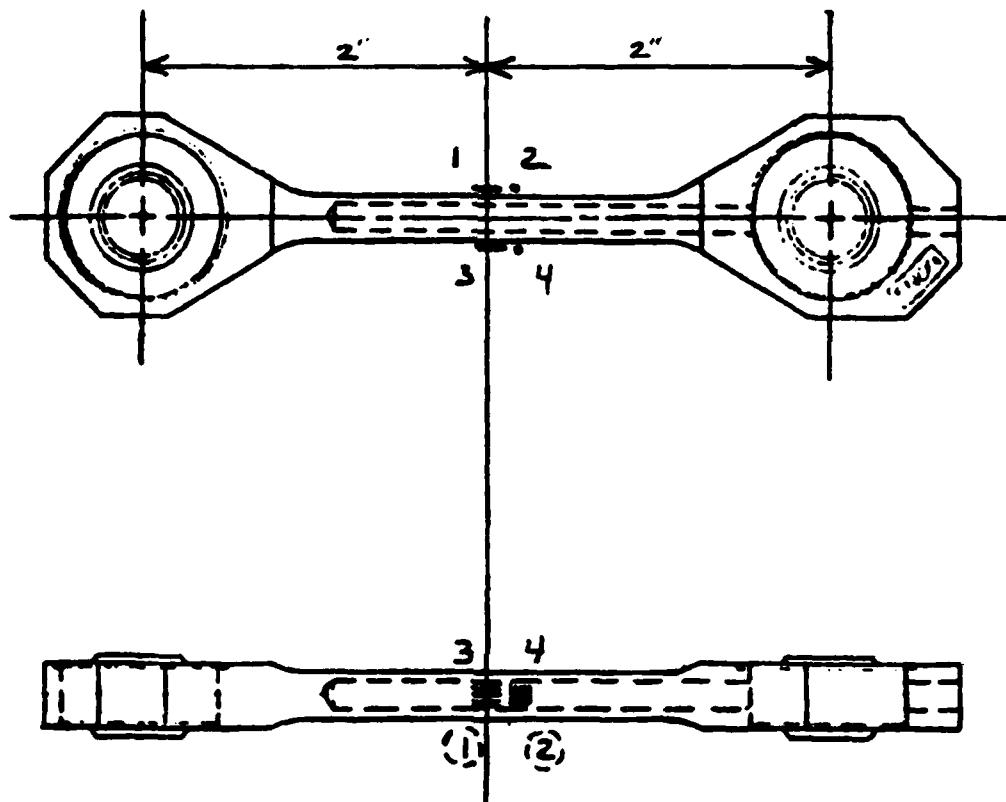
Max. Load: 0 parts in 2,000 = --

End Point : .4 parts in 2,000 = .03%

Hysteresis : 1 parts in 2,000 = .05%

Hold Down Bolts: 10-32NF; Torque = 6 ft. lb. lubricated

Figure A-13 - LOAD CELL SPECIFICATIONS



NOTES: \*Strain Gages are  
Micro-Measurements  
Model EA-06-062TJ-350  
\*Z arms active

Figure A-14 - LOAD CELL SPECIFICATIONS (LOAD LINK)



Figure A-15 - FOOTREST ASSEMBLY

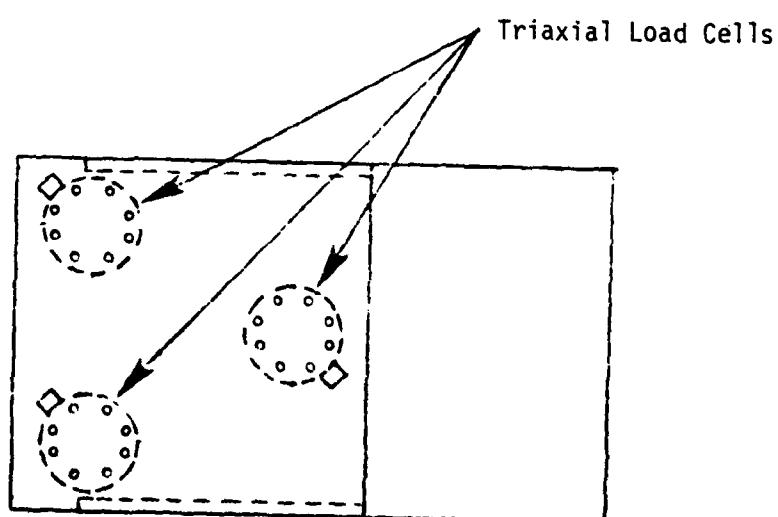
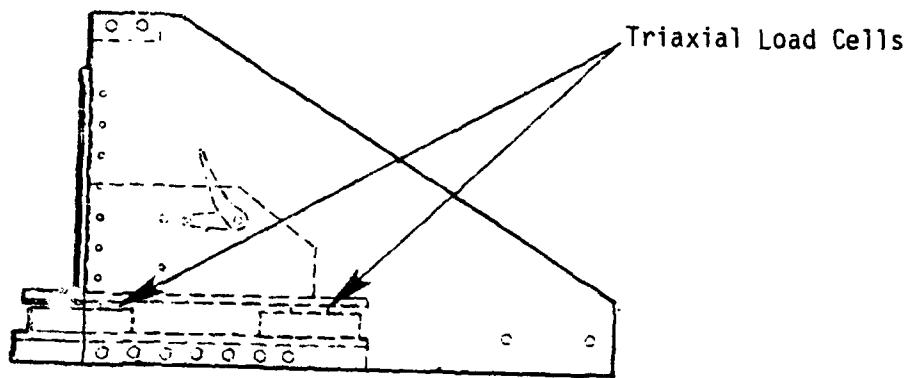
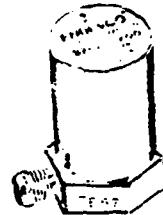


Figure A-16 - FOOT REST LOAD CELL LOCATIONS

**2262A-200**  
**2262CA-200**  
**Damped, Overload Stops**  
**PIEZORESISTIVE**  
**ACCELEROMETERS**



**SPECIFICATIONS FOR MODEL**

**2262A-200 and 2262CA-200 ACCELEROMETERS**

Models 2262A-200  
(2262CA-200)

<b>DYNAMIC</b>	-200 g to 200 g
<b>RANGE</b>	$\pm 300$ to $\pm 1\,200$ g
<b>OVERRANGE LIMITING</b>	2.5 mV/g typical (1.2 mV/g typical)
<b>SENSITIVITY</b>	2 mV/g minimum (1 mV/g minimum)
<b>MOUNTED NATURAL FREQUENCY (AT 75°F)</b>	7,000 Hz typical
<b>FREQUENCY RESPONSE</b>	$\pm 5\%$ maximum 0 to 3,000 Hz at 75°F, -35° to 105° typical at 0.200° F and 3,000 Hz
<b>DAMPING RATIO</b>	0.7 typical
<b>TRANSVERSE SENSITIVITY</b>	3% maximum
<b> THERMAL SENSITIVITY SHIFT</b>	$\pm 2\%$ of reading, maximum.
<b>LINEARITY AND HYSTERESIS</b>	to 200 g
 <b>ELECTRICAL</b>	 
<b>EXCITATION</b>	10.00 Vdc
<b>INPUT RESISTANCE (AT 75°F)</b>	1,600 $\Omega$ typical (1,000 $\Omega$ typical)
<b>OUTPUT RESISTANCE (AT 75°F)</b>	1,200 $\Omega$ typical (1,000 $\Omega$ typical)
<b>INSULATION RESISTANCE</b>	100 G $\Omega$ minimum
<b>ZERO MEASURAND OUTPUT</b>	$\pm 25$ mV maximum
 <b>ENVIRONMENTAL</b>	 <b>0°F to +200°F</b>
<b>ACCELERATION LIMITS (in any direction)</b>	Static 2,000 g Sinusoidal 1,000 g pk Shock 2,000 g half sine pulse
<b>TEMPERATURE</b>	Compensated 0°F to +200°F (-18°C to +93°C) Nonoperating -20°F to +220°F (-29°C to +104°C)
<b>HUMIDITY</b>	Sealed by glass to metal fusion and welding.

**Figure A-17 - ACCELEROMETER SPECIFICATIONS**

## PROGRAM Bracing Position Study

DATE 26 Nov 80

VDT FACILITY RUN NO'S 529-564

DATA POINT	TRANSDUCER MFG & MODEL	S/N	PRE CAL		POST CAL		% CHANGE	COMMENTS
			DATE	SENS	DATE	SENS		
Carriage X	Endevco 2264-200	BX49	30 Sep 80	2.581	22 Dec 80	2.569	-.5	
Carriage Y	Endevco 2264-150	BB11	30 Sep 80	2.354	22 Dec 80	2.353	0	
Carriage Z	Endevco 22624-200	FR42	09 Oct 80	4.161	22 Dec 80	4.124	-.9	
Head X	Endevco 2264-200	BP10	30 Sep 80	2.496	22 Dec 80	2.492	-.2	
Head Y	Endevco 2264-200	BQ42	30 Sep 80	2.713	22 Dec 80	2.715	0	
Head Z	Endevco 2264-200	BQ51	30 Sep 80	2.553	22 Dec 80	2.559	.2	
Chest X	Endevco 2264-150	BC26	29 Sep 80	2.786	22 Dec 80	2.795	.3	
Chest Y	Endevco 2264-150	BB13	29 Sep 80	2.430	22 Dec 80	2.420	-.4	
Chest Z	Endevco 2264-150	2A20	29 Sep 80	2.619	22 Dec 80	2.634	.6	
Seat X	Endevco 2264-200	BV63	30 Oct 80	2.564	23 Dec 80	2.574	.4	
Seat Y	Endevco 2264-200	BV41	30 Oct 80	3.298	23 Dec 80	3.280	-.5	
Seat Z	Endevco 2264-200	BN63	30 Oct 80	2.825	23 Dec 80	2.822	-.1	
Seat Pan Z 2	Entrair EGA-125-1000	A4-4	10 Nov 80	1.679	23 Dec 80	1.720	+2.4	
Foot Plate Z	"	A5-5	10 Nov 80	1.617	23 Dec 80	1.623	.4	

Figure A-18

PROGRAM Bracing Position Study

DATE 26 Nov 80

VDT FACILITY RUN NO's 529-564

DATA POINT	TRANSDUCER MFG & MODEL	S/N	PRE CAL SENS	POST CAL SENS	% CHANGE	COMMENTS
LF Load Link X	MM EA-06-062-TJ-350,	001	03 Oct 80 10.79	29 Dec 80 10.73	-.6	
RT Load Link X	"	002	03 Oct 80 10.11	29 Dec 80 10.05	-.6	
CEN Load Link Y	"	004	03 Oct 80 10.23	29 Dec 80 10.20	-.3	
LF Lap	MM EA-06-125BZ-350	13	02 Oct 80 15.10	29 Dec 80 14.89	-1.4	
RT Lap	"	14	02 Oct 80 13.66	29 Dec 80 13.63	-.2	
N-G Strap	"	143377	03 Oct 80 1.80	29 Dec 80 1.71	-5.0	
LF Ref Strap	"	02-10	02 Oct 80 26.32	29 Dec 80 25.97	-.9	
RT Ref Strap	"	01-3	02 Oct 80 34.04	29 Dec 80 33.97	-.2	
LF Inert RL Strap	"	363	02 Oct 80 7.86	29 Dec 80 7.82	-.5	
RT Inert RL Strap	"	364	02 Oct 80 7.54	29 Dec 80 7.51	-.4	

Figure A-19

"X" AND "Y" AXIS COORDINATES OF SEAT PAN REFERENCE POINT  
FOR ALL VARIABLES OF SEAT HEIGHT AND SEAT PAN POSITION

SEAT PAN POSITION	'X' AXIS						'Y' AXIS	
	1	2	3	4	5	6	SEAT PAN	
1	-16.50	-17.50	-16.50	-16.50	-17.50	-17.50	-11.50	
2	-16.60	-17.60	-16.60	-16.60	-17.60	-17.60	-10.60	
3	-12.07	-13.27	-12.07	-12.07	-13.27	-13.27	-9.52	
4	-12.17	-13.37	-12.17	-12.17	-13.37	-13.37	-8.75	
5	-12.47	-13.67	-12.47	-12.47	-13.67	-13.67	-7.98	
6	-12.67	-13.87	-12.67	-12.67	-13.87	-13.87	-7.00	

"X" AND "Y" AXIS COORDINATES ARE IN FOR ALL CONDITIONS

"Z" AXIS COORDINATES OF POSTREST ASSEMBLY REFERENCE POINT  
FOR ALL VARIABLES OF POSTREST POSITION

'Z' AXIS						
POSTREST POSITION						
1	2	3	4	5	6	7
-48.0	-47.0	-43.0	-40.0	-35.0	-31.0	-32.0

"X" AND "Y" AXIS MEASUREMENTS ARE IN FOR ALL CONDITIONS

ALL REQUIREMENTS ARE REFERENCED TO THE SEAT ZERO REFERENCE

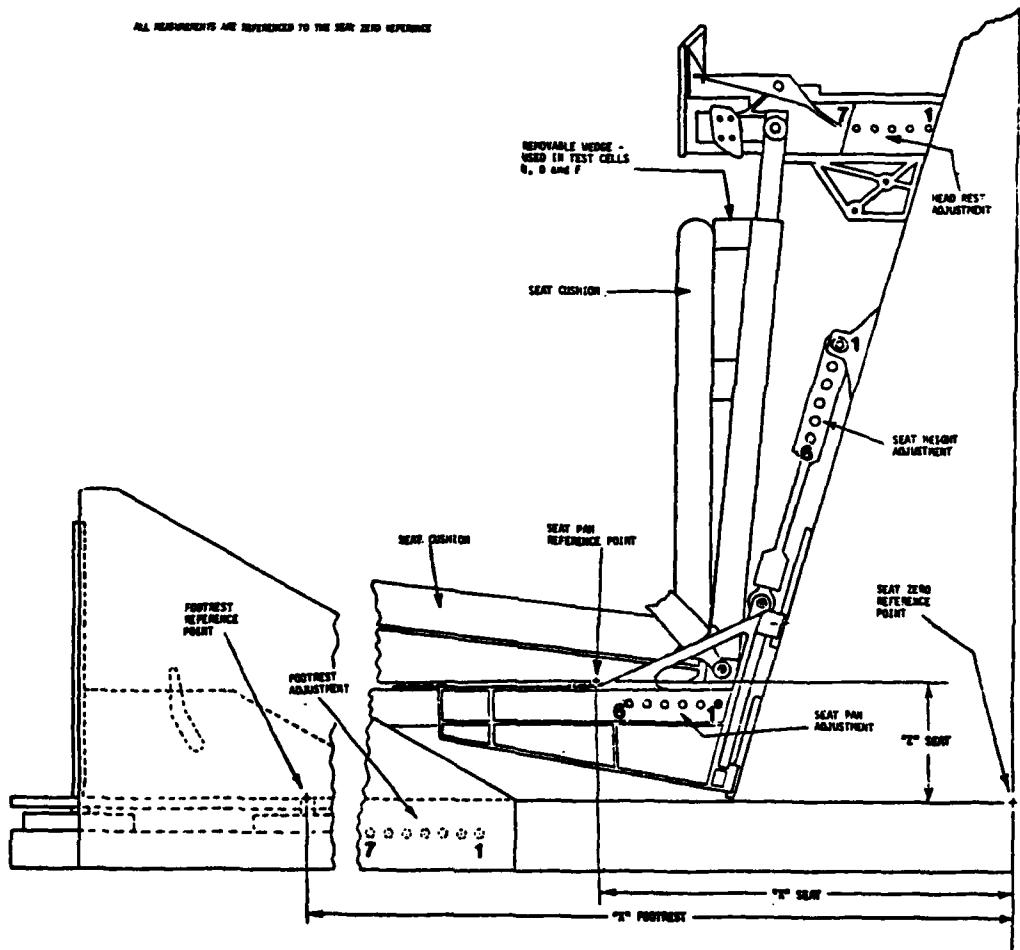


Figure A-20 - SEAT GEOMETRY

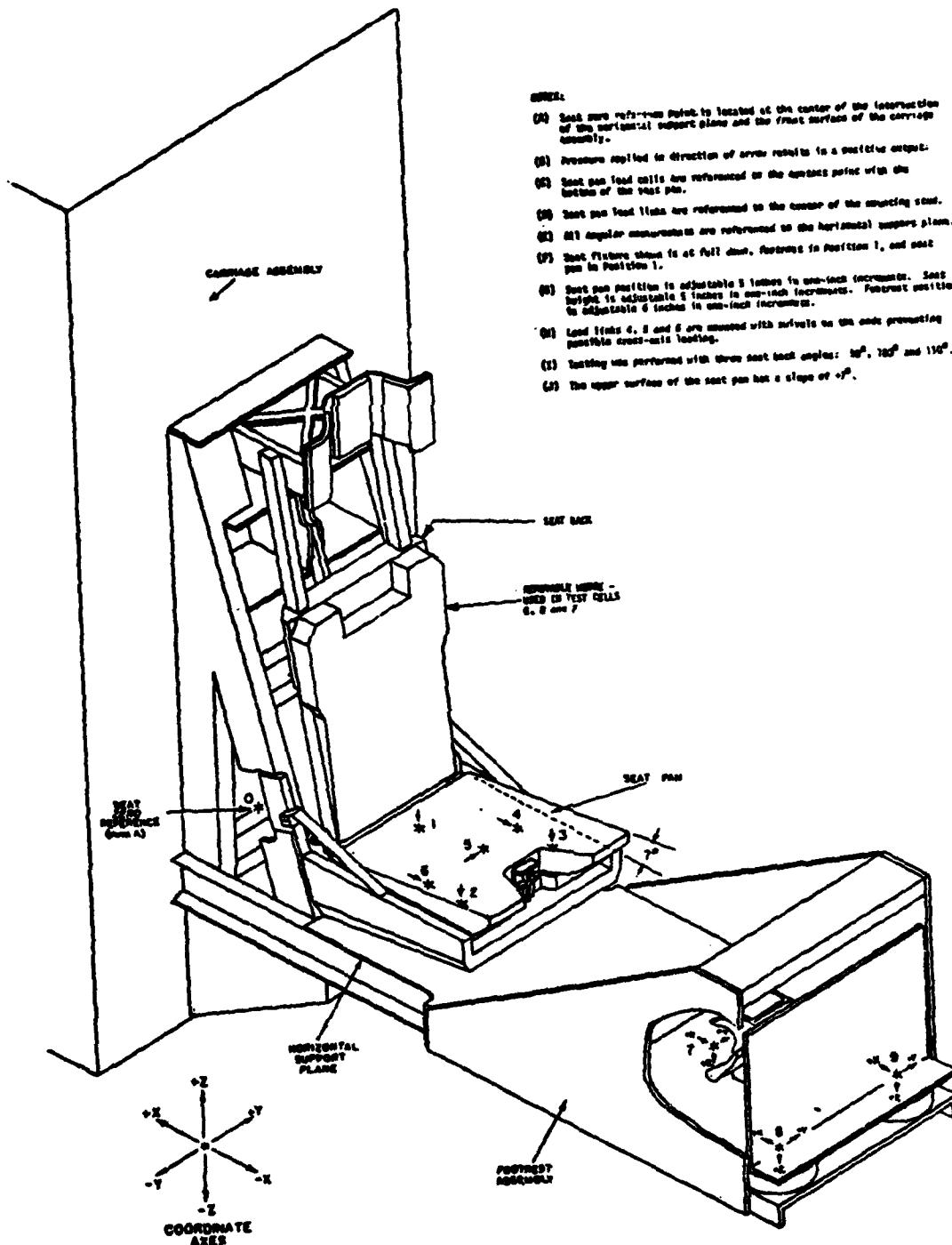


Figure A-21 - SEAT GEOMETRY

## AUTOMATIC DATA ACQUISITION AND CONTROL SYSTEM

### CARRIAGE DIGITAL DATA ACQUISITION SYSTEM EQUIPMENT

Figure A-22 is a photograph of the Carriage Digital Data Acquisition System. Figure A-23 shows the block diagram of the Carriage Digital Data Acquisition System. This system consists of four parts: the power conditioner, the signal conditioner and sensors, the encoder and the junction box. The power conditioner requires a 28 vdc, 4A power source and provides several regulated supplies. They are the +15 and -12 vdc (0.8A) supply for the signal conditioners, the 5 vdc and the 10 vdc bridge excitation voltages (1.2A total), and the 2.5 vdc signal output bias voltage (0.1A). The 28 vdc source also powers the pulse code modulator (PCM) encoder (0.24A).

The signal conditioner consists of 48 signal modules. Each module is capable of processing a sensor (transducer) signal which can be a voltage generating source or a bridge-type sensor. If a bridge-type sensor is used, the bridge excitation voltage is selectable from the 5V or the 10V source. By connecting the proper external resistors to the module input connector a half bridge is completed. A full or half bridge is balanced by connecting external resistors to its module input connector.

The signal conditioning module consists of a amplifier section and a filter section. The amplifier gain can be selected by inserting one of seven external gain plugs. These gains provide the capability of covering an input dynamic range from 50 mV up to 5 V. The filter section can be programmed by inserting one of four external filter plugs. These filter plugs are in accordance with the SAE recommended classes 60, 180, 600 and 1000.

The 48 channel data signals are time multiplexed and digitized via an encoder into 48 11-bit digital words. Two additional 11-bit synchronization (sync) words are added to the data frame. The 50-word frame is then sampled at a rate of 1000 samples/second. These serial digital data along with three additional synchronization pulse trains (bit sync, word sync, and frame sync) are connected to the computer room by four twisted pairs incorporated into a drag cable. They pass through a junction box to the digital computer interface to allow recording and processing.

#### PDP 11-34 DATA COLLECTION AND STORAGE

The PDP 11-34 minicomputer is the main control for all electronic data collection and storage functions. The block diagram of Figure A-24 shows the processor and its related equipment. All data transfer in the data collection system are under software control by the central processor unit. Serial data are constantly being received by the data formatter unit from the carriage data encoder. These data are converted by the data formatter from serial to parallel for input via a buffered data channel to computer memory for storage on disk. Finally, the data are transferred from disk to magnetic tape for permanent storage following the test event.

#### QUICK LOOK INERTIAL DATA

After each test, the data were sampled and checked. This check was made using the Single Channel ANalysis (SCAN) routine for the PDP 11-34 processor. This routine allows the operator to access and plot up to 2000 points of data for any of the 48 data channels. The operator selects the channel to be processed and enters its location description as well as the start and stop points to be processed. A maximum of 2000 milliseconds or 2000 data points may be accessed for each plot. The program converts the raw data into the appropriate units of measure and calculates the minimum and maximum values during the sample interval. If the sample is acceleration data, the velocity will also be calculated using an integration process.

An added optional feature is a digital smoothing routine which can smooth the data to remove any excess high frequency component that may be present.

#### FOOT REST AND SEAT PAN CORRECTION

Dynamic foot and seat pan loads were corrected by removing the effects of the foot support fixture and seat pan loading on supporting load cells.

A series of tests was conducted to determine the percentage of the total force resting on each cell. The weight assessed each load cell and multiplied by the carriage acceleration was subtracted from the acquired test data in the processing.

In practice, the load cell outputs are zeroed with the foot support fixture and seat pan weight resting on the load cells. During a drop, with no payload, the sum output of the load cells would reflect the weight of the fixture as a negative load (fixture weight removed from the load cell). The data were processed to remove this effect and thus reflect a zero output during a drop with no payload.

The final foot and seat pan loads were processed to provide corrected values which represent actual loads encountered by the human or dummy subjects.

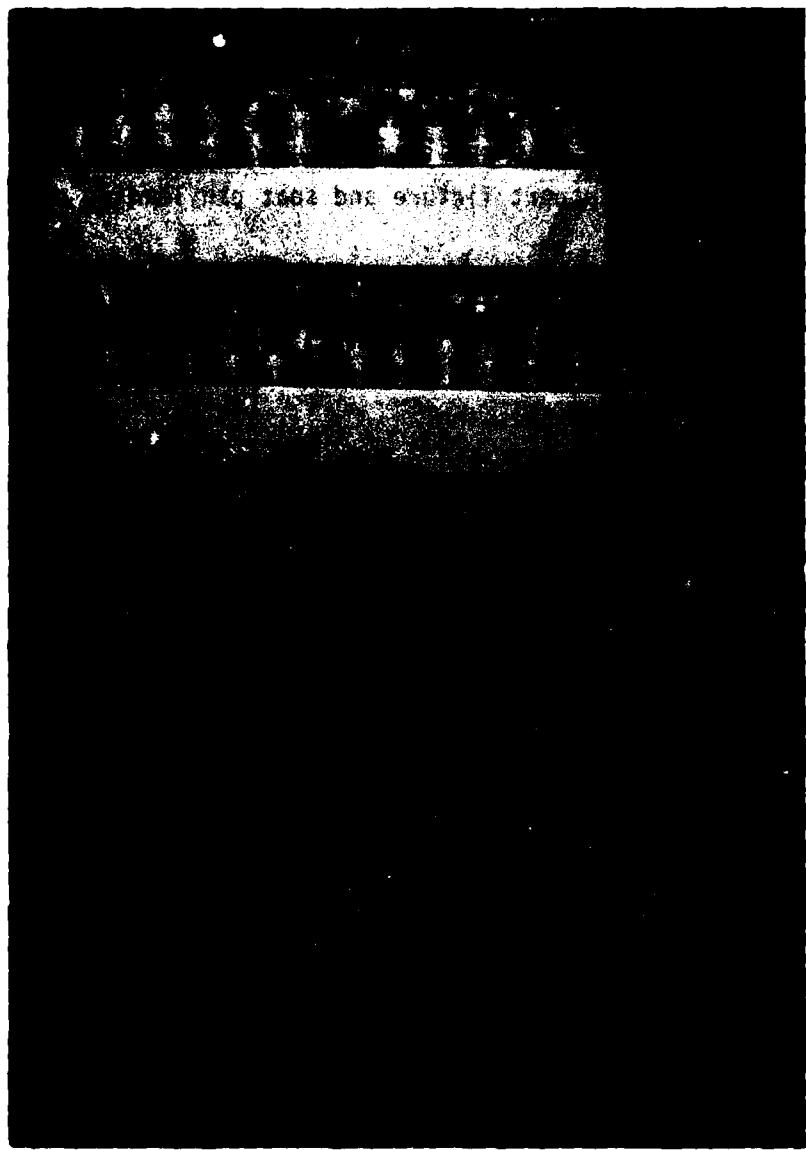


Figure A-22 - CARRIAGE DIGITAL DATA ACQUISITION SYSTEM

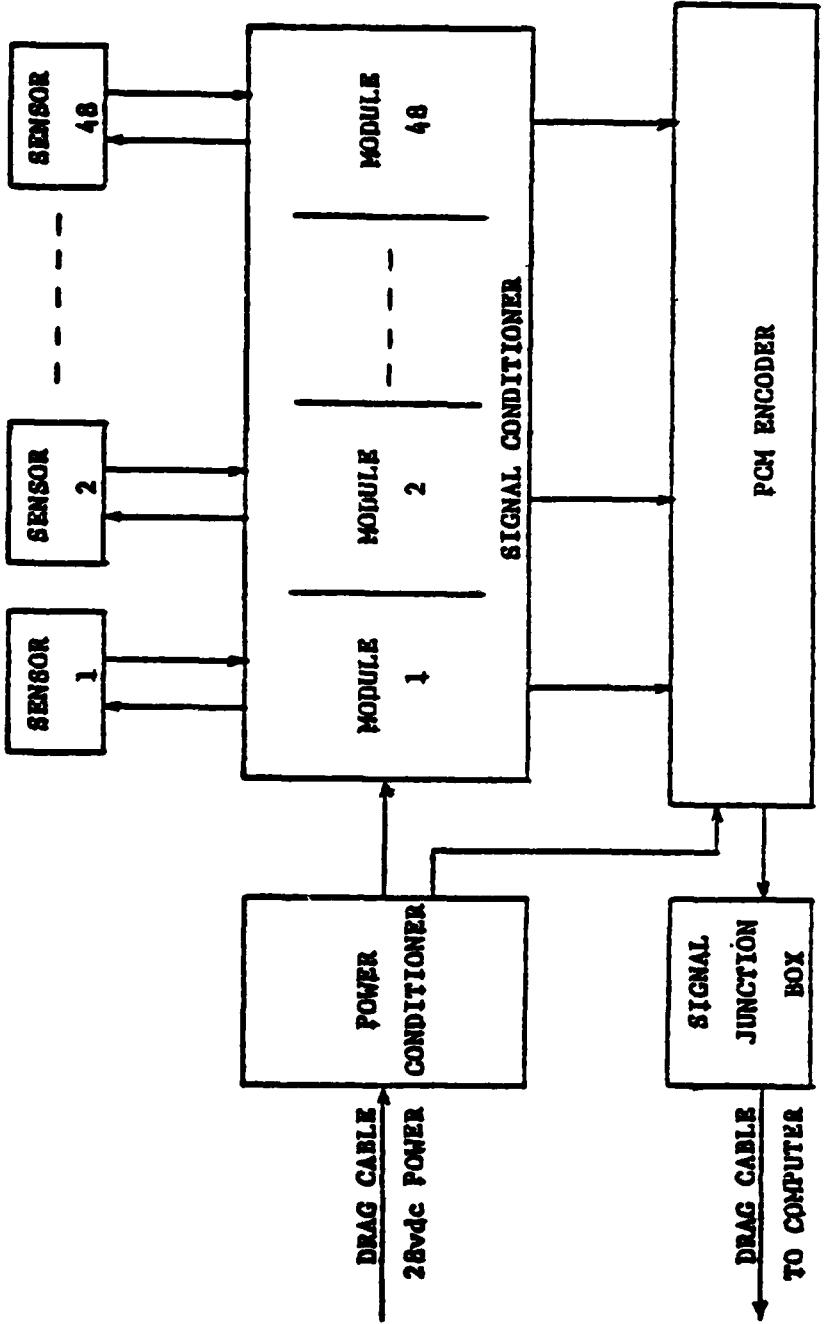


Figure A-23 - CARRIAGE DIGITAL DATA ACQUISITION SYSTEM BLOCK DIAGRAM

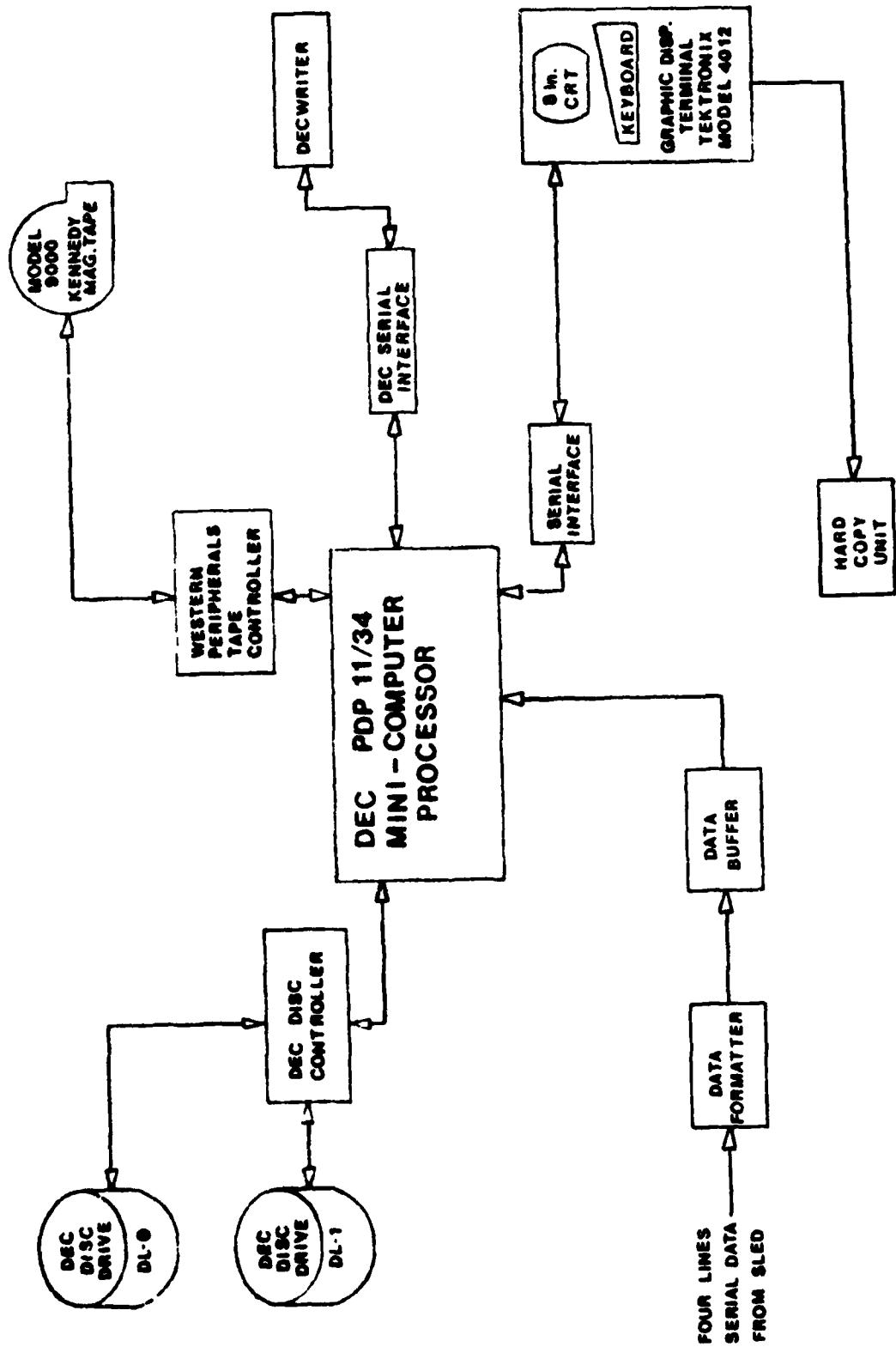


Figure A-24 - CENTRAL DATA ACQUISITION AND STORAGE SYSTEM

## KINEMATIC DATA ACQUISITION SYSTEM

### HIGH SPEED CAMERAS AND CONTROL

Kinematic data were acquired through the use of high speed 16mm cameras operating at a rate of 500 frames per second. The cameras were Teledyne Milliken Model DBM45 pin registered units which were capable of withstanding 25 G. Two cameras were mounted to the carriage, one to provide a frontal view and one to provide a right lateral view of the subject. During a test the cameras were started and stopped automatically by the Camera and Lighting Control Station which is part of the impact facility safety and control system. The cameras were started at a preset time in the test sequence and run for a period of 8 seconds.

### AUTOMATIC FILM READER

The AFR subsystem was developed by Photo Digitizing Systems, Inc. It automatically extracts photo data, digitizes it and records it on magnetic tape. The subsystem consists of:

- Film motion analyzer with 16mm projection head
- Electronic scanning camera
- Control Unit
- Alphanumeric Cathode Ray Tube (CRT)
- Line printer
- Magnetic tape transport

The film reader recognizes quadrant or circular fiducial targets. It automatically tracks targets and extracts data for up to twelve targets per film frame at a minimum rate of one-half frame per second. Film may be processed through the reader manually or automatically.

Figure A-25 is a block diagram of the Automatic Film Reader System (AFR). The X-Y coordinate position of each target on each film frame is input to the computer and recorded on magnetic tape.

A NOVA 3/12 computer controls the AFR which contains 16K, 16-bit, words of core memory, a CRT terminal, and a magnetic tape transport with suitable interface. In addition, a parallel data link is provided between the NOVA 3/12 and the PDP 11/34.

An alphanumeric CRT (DGC 6052) automatically displays the AFR control information. The CRT display and its keyboard function are used as separate devices. The keyboard is a transmit-only device and the display is a receive-only device but has the additional capability of transmitting cursor position information on program request.

A hard copy device, LA36 Decwriter II, provides hard copies of the information presented on the 6052 CRT. The LA36 is medium-sized interaction terminal with a low-speed impact printer and a standard ASCII keyboard consisting of alphanumeric characters and non-printing system control codes.

Either the Decwriter or the 6052 CRT output may be assigned to the PDP 11/34A. Programs can also be established which can "down load" from the disc on the PDP 11/34A to the NOVA, or digital film data can be loaded on the PDP 11/34A for processing or disc storage.

#### QUICK LOOK KINEMATIC DATA

The Instar (Instant Analytical Replay) System is a high-performance video recorder and display device designed for the analysis of high speed motion. It is a compact, portable, fully transistorized instrument that combines the long recording capacity and instant replay features of video tape. The system records 120 frames/second with an effective shutter speed of 10us or less and will playback all recordings in real time, stop action, reverse slow motion, and variable slow motion (2%-15% of real time). Each of the frames is sequential and non-interlaced.

Instar incorporates two cameras and a special effects generator for the added flexibility of split screen. The simultaneous display of two events offers the precise evaluation of three dimensional problems

or the referencing of one physical event to an instrument (i.e., digital clock or oscilloscope). Other features include:

- End of tape sensing
- Foolproof logic control sequences
- Dynamic braking
- Interscene blanking
- Video logic signal processing modules

The Instar System was utilized to record each impact event. This video tape was available for review by the test conductor and/or medical monitor immediately after the impact event.

#### TIMING REFERENCE

A 100 PPS timing signal was an intergral part of the Kinematic Data Acquisition System. The Camera and Lighting Control Station started the timing signal at  $T = 0$ . An event signal was generated less than one second after  $T = 0$ . This event signal performed two functions. It triggered a photo flash unit which marked the film frame at the beginning of the impact event. Second, it started the 100 PPS signal to the LED drivers, LM Dearing Model 2/3/3R. The LEDs, located in the high-speed cameras, were pulsed every 10 ms which produced a .75 ms timing bar on the edge of the film. The diagram of Figure A-26 shows the 100 PPS signal, the event signal and the LED driver signal. Figure A-27 illustrates the event and timing bar in relationship to the film.

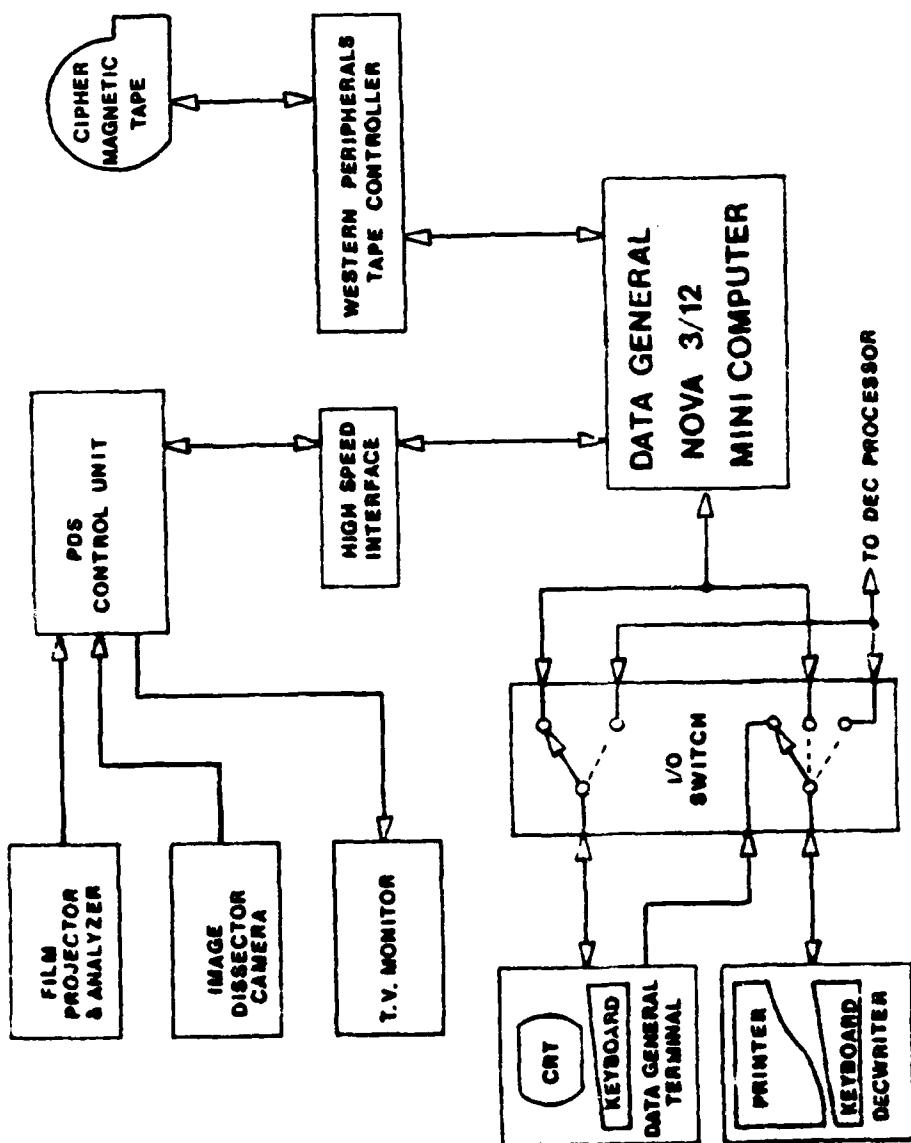


Figure A-25 - AUTOMATIC FILM READER SYSTEM BLOCK DIAGRAM

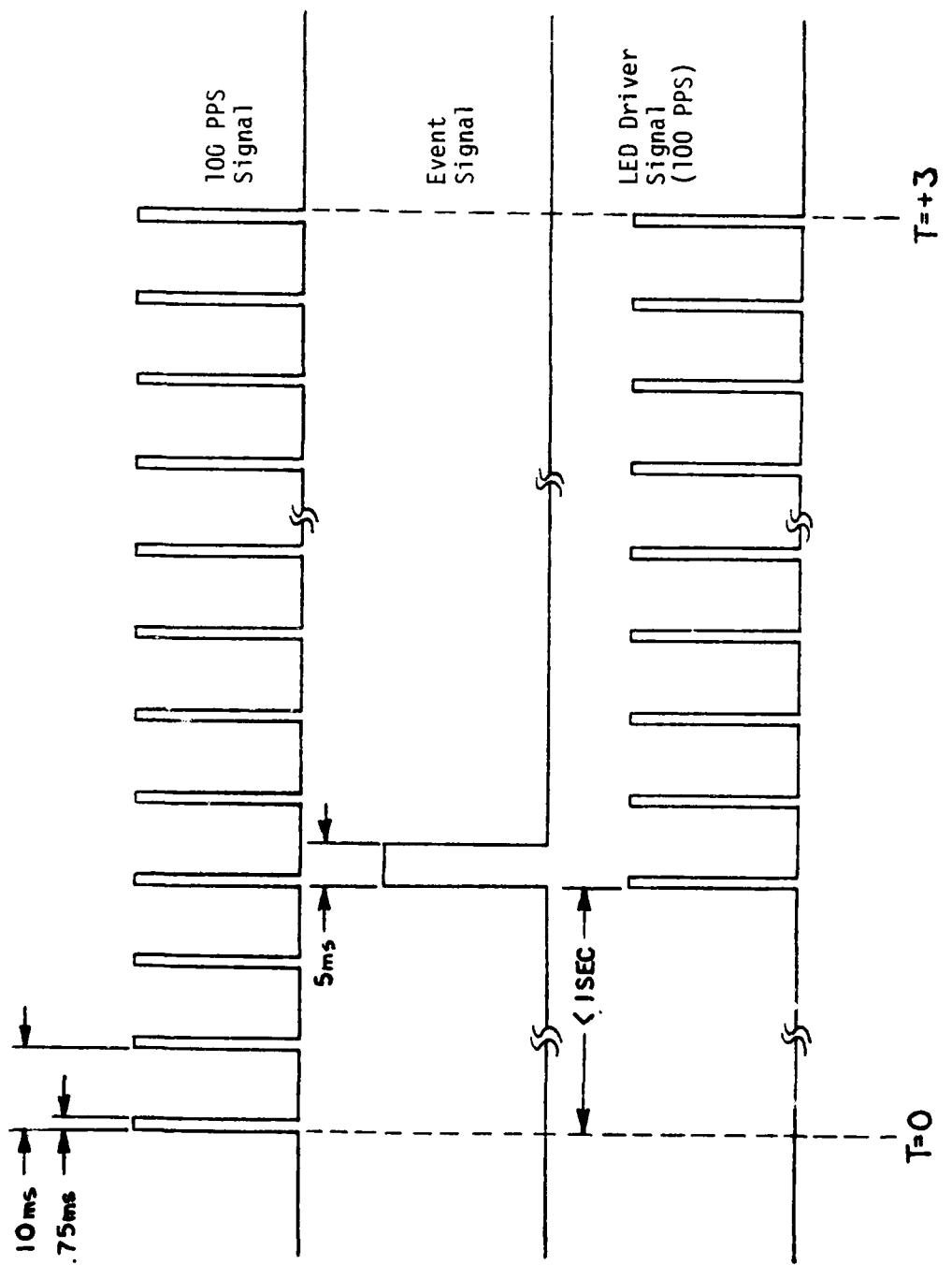


Figure A-26 - TIMING REFERENCE

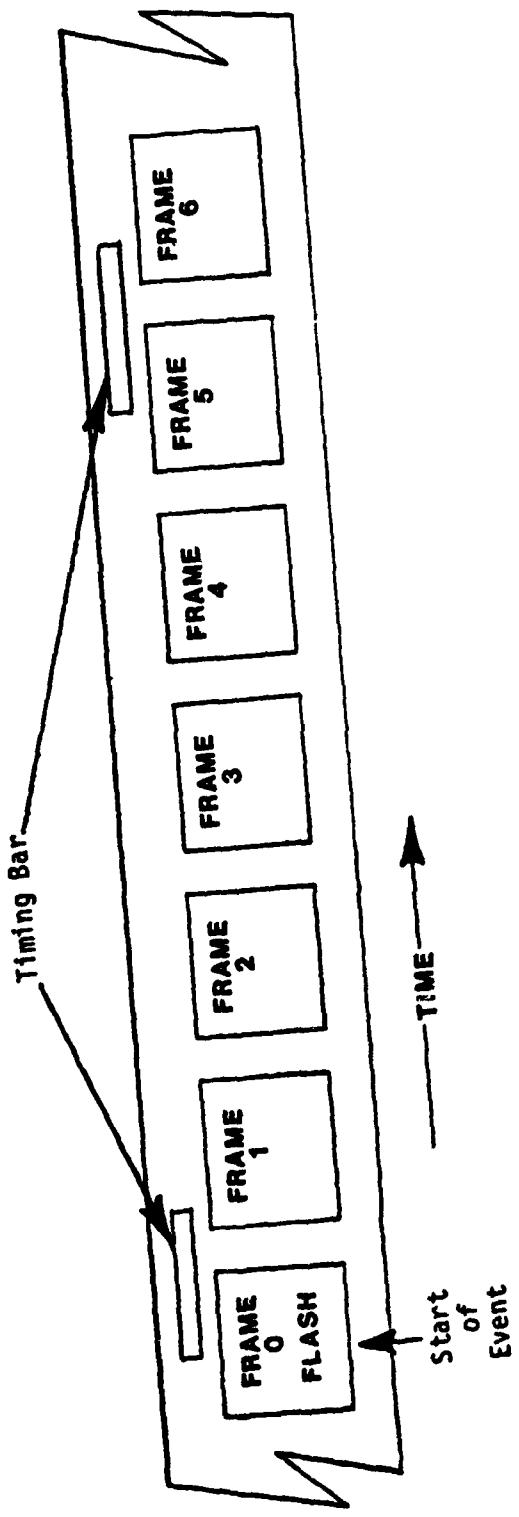


Figure A-27 - TIMING REFERENCE

## APPENDIX B

### SUMMARY OF ELECTRONIC DATA

The means and estimated standard deviations of all peak measured and computed parameters from each cell of experimental matrix are shown in Table B-1. (The cell designations are explained in the experimental design matrix, Table 1, in the body of the report.) In addition, the maximum and minimum values of each parameter are tabulated for each test conducted at the experimental level. The times at which these values were achieved during the impact are also tabulated. These data are grouped according to test condition. Finally, a set of analog data from each test condition is presented. To permit comparability among these data, the test results of the same subject, F-2, are shown in each test condition. This subject was selected because his tabulated maxima and minima in each of the three tests were not beyond 2.5 standard deviations of the mean and because the subject's body weight, standing height, and sitting height were close to the means of those anthropometric measurements for the sample under investigation. (See Table 2.)

All electronic data derived from this test program will be maintained by the Biomechanical Protection Branch of AFAMRL until this work unit is retired. These experimental results will eventually be recorded in a permanent data bank within the Laboratory.

TABLE B-1  
SUMMARY OF ELECTRONICALLY MEASURED AND COMPUTED DATA

(Peak values are tabulated for velocity, accelerations and loads.)

MATRIX CELL BRACING POSITION	G		K		L	
	Hands-in-Lap (n = 18)		Crossed-Arms (n = 12)		Hands-on-Knees (n = 17)	
	Mean	St Dev	Mean	St Dev	Mean	St Dev
CARRIAGE ACCELERATION (G)	10.6	0.20	10.6	0.26	10.5	0.24
CARRIAGE VELOCITY (ft/Sec)	-25.9	0.57	-26.2	0.07	-26.2	0.06
SEAT ACCELERATION (G)	10.8	0.33	11.3	0.18	11.2	0.14
CHEST ACCELERATION (G)						
-X axis	-2.11	0.62	-1.08	0.89	-1.73	0.67
+X axis	3.42	1.02	2.97	0.82	2.73	0.99
+Z axis	17.1	2.20	16.5	1.88	15.5	1.38
Resultant	17.3	2.18	16.7	1.82	15.9	1.33
CHEST SEVERITY INDEX	32.5	4.13	29.0	3.09	28.0	3.64
HEAD ACCELERATION (G)						
-X axis	-3.18	1.04	-3.51	1.34	-3.42	0.91
+X axis	1.72	0.97	1.10	0.70	1.11	0.92
+Z axis	12.5	0.77	11.1	0.98	12.3	0.77
Resultant	12.6	0.80	11.4	0.85	12.5	0.72
HEAD SEVERITY INDEX	19.4	2.05	16.1	1.26	17.3	1.73
STRAP LOADS (lb)						
Reflection Straps	67	20	106	29	71	21
Inertia Reel Straps	78	25	207	41	64	25
Total Shoulder Straps	137	35	280	56	122	35
Total Lap Belt	89	27	83	22	104	19
SEAT PAN LOADS (lb)						
-X axis	-276	63	-263	74	-244	110
+Z axis	1740	257	1660	229	1700	222
Resultant	1760	258	1690	234	1730	223
FOOTREST LOADS (lb)						
-X axis	-400	96	-363	64	-539	115
+Z axis	471	75	370	53	476	106
Resultant	573	107	501	75	709	137

BRACING STUDY TEST: 431 SUBJ: D-1 WT: 216.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
	---	---	--	--	--
10V EXT PWR	10.02	9.98	377.00	480.00	48
CARRIAGE X	1.16	-1.20	3874.00	3866.00	36
CARRIAGE Y	0.88	-0.40	3876.00	3814.00	31
CARRIAGE Z	12.44	-0.17	3866.00	3783.00	1
CARRIAGE Z (SM)	10.56	-0.06	3867.00	3780.00	
CARRIAGE VEL	-1.26	-26.22	4190.00	3824.00	29
SEAT X	1.28	-1.24	3829.00	3866.00	32
SEAT T	0.79	-0.91	3843.00	3837.00	33
SEAT Z	11.62	-0.13	3873.00	3683.00	34
SEAT Z (SM)	10.73	-0.07	3874.00	3683.00	
CHEST X	4.52	-1.89	3882.00	3937.00	5
CHEST Y	-0.39	-2.64	3868.00	3878.00	6
CHEST Z	14.63	-0.41	3894.00	3769.00	7
CHEST RES	14.99	0.73	3894.00	4088.00	
CHEST SI	30.77		3829.00	3951.00	
HEAD X	2.56	-2.33	3886.00	3929.00	2
HEAD Y	2.39	0.66	3942.00	3887.00	3
HEAD Z	11.88	-1.30	3865.00	3757.00	4
HEAD RES	12.15	1.41	3885.00	4142.00	
HEAD SI	16.77		3841.00	3954.00	
HEAD HIC	14.15		3857.00	3928.00	
SHD REFL LF	61.19	2.50	3951.00	3872.00	14
SHD REEL LF	43.47	5.32	3932.00	3883.00	16
LF SHOULDER	89.92	9.93	3949.00	3874.00	
SHD REFL RT	62.01	11.99	3957.00	3879.00	15
SHD REEL RT	47.30	5.96	3924.00	3889.00	17
RT SHOULDER	63.14	16.83	3931.00	3889.00	
TOTAL SHD REFL	122.12	16.56	3957.00	3874.00	
TOTAL SHD REEL	85.11	11.83	3929.00	3884.00	
TOTAL SHOULDER	172.02	30.87	3948.00	3875.00	
TOTAL SHD / WT	0.80	0.14	3948.00	3875.00	
LF LAP BELT	46.50	24.06	3984.00	3867.00	8
RT LAP BELT	53.72	31.23	3954.00	3875.00	9
TOTAL LAP	97.05	56.78	3954.00	3867.00	
TOTAL LAP / WT	0.45	0.26	3954.00	3867.00	
CROTCH STRAP	303.89	-22.29	3963.00	3884.00	10
LF SEAT LNK X	44.62	-212.91	4199.00	3881.00	18
RT SEAT LNK X	22.25	-74.90	3945.00	3881.00	19
TOTAL SEAT X	41.04	-287.82	4199.00	3881.00	
SEAT LNK Y	71.01	-65.11	3911.00	3882.00	35
LF SEAT PAN Z	563.62	61.93	3884.00	3655.00	11
RT SEAT PAN Z	441.35	47.98	3884.00	3640.00	12
CT SEAT PAN Z	1194.74	128.93	3887.00	3600.00	13
TOTAL SEAT Z	2194.61	249.29	3884.00	3604.00	
TOTAL SEAT Z / WT	10.16	1.15	3884.00	3604.00	
RES SEAT FORCE	2213.44	250.28	3884.00	3604.00	
RES SEAT FORCE / WT	10.25	1.16	3884.00	3604.00	
LF FOOT X	5.55	-159.90	3833.00	3885.00	20
RT FOOT X	16.41	-123.70	3956.00	3884.00	23
CT FOOT X	-34.61	-297.57	3833.00	3884.00	26
TOTAL FOOT X	-21.47	-580.27	3833.00	3884.00	
LF FOOT Y	160.88	-1.59	3859.00	4069.00	21
RT FOOT Y	29.34	-124.19	3924.00	3878.00	24
CT FOOT Y	-1.30	-68.05	3685.00	3877.00	27
TOTAL FOOT Y	40.94	-63.64	3925.00	3878.00	
LF FOOT Z	219.56	-20.43	3870.00	3824.00	22
RT FOOT Z	264.27	24.22	3878.00	4107.00	25
CT FOOT Z	142.91	-100.49	3878.00	3824.00	26
TOTAL FOOT Z	556.06	-65.92	3871.00	3824.00	
RES FOOT FORCE	733.02	74.99	3888.00	4106.00	

BRACING STUDY TEST: 456 SUBJ: F-3 WT: 161.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.02	9.98	1491.00	118.00	48
CARRIAGE X	1.32	-1.06	3797.00	3809.00	36
CARRIAGE Y	0.80	-0.77	3789.00	3810.00	31
CARRIAGE Z	12.07	-0.23	3831.00	3751.00	1
CARRIAGE Z (SM)	10.39	-0.09	3846.00	3753.00	
CARRIAGE VEL	-0.86	-24.54	4192.00	3773.00	29
SEAT X	1.75	-1.02	3796.00	3808.00	32
SEAT Y	0.91	-1.15	3794.00	3803.00	33
SEAT Z	11.29	-0.23	3837.00	3655.00	34
SEAT Z (SM)	10.56	-0.13	3838.00	3655.00	5
CHEST X	2.07	-2.67	3848.00	3891.00	6
CHEST Y	-0.46	-2.27	3833.00	3845.00	7
CHEST Z	16.11	-0.72	3861.00	3654.00	
CHEST RES	16.19	1.30	3801.00	3916.00	
CHEST SI	28.36	-1.43	3838.00	3891.00	2
HEAD X	.83	-1.43	3836.00	3859.00	34
HEAD Y	2.41	-0.07	3923.00	3859.00	
HEAD Z	11.86	-1.07	3854.00	4034.00	
HEAD RES	11.86	1.68	3807.00	3814.00	
HEAD SI	18.92	-	3825.00	3893.00	
HEAD HIC	16.56	-	3914.00	3834.00	14
SHO REFL LF	42.84	3.10	3869.00	3844.00	16
SHO REEL LF	58.63	10.49	3890.00	3844.00	
LF SHOULDER	93.33	16.46	3929.00	3833.00	15
SHO REFL RT	47.29	19.97	3890.00	3959.00	17
SHO REEL RT	52.04	8.53	3890.00	3853.00	
RT SHOULDER	92.57	39.26	3890.00	3834.00	
TOTAL SHO REFL	110.45	23.30	3889.00	4088.00	
TOTAL SHO REEL	165.90	57.95	3890.00	3845.00	
TOTAL SHOULDER	1.15	0.36	3890.00	3845.00	8
TOTAL SHO / WT	41.36	4.47	3924.00	3841.00	9
LF LAP BELT	52.34	7.02	3927.00	3840.00	
RT LAP BELT	93.54	11.68	3926.00	3840.00	
TOTAL LAP	0.58	0.07	3926.00	3841.00	
TOTAL LAP / WT	144.89	13.65	3922.00	3841.00	10
CROTCH STRAP	41.75	-170.84	3925.00	3851.00	18
LF SEAT LNK X	34.84	-62.93	3800.00	3845.00	19
RT SEAT LNK X	47.69	-233.16	3925.00	3851.00	
TOTAL SEAT X	66.61	-46.22	3901.00	3854.00	35
SEAT LNK Y	439.69	26.68	3854.00	3813.00	11
LF SEAT PAN Z	322.55	28.19	3853.00	3655.00	12
RT SEAT PAN Z	814.30	69.90	3855.00	3603.00	13
CT SEAT PAN Z	1572.26	134.78	3853.00	3613.00	
TOTAL SEAT Z	9.77	0.84	3853.00	3613.00	
TOTAL SEAT Z / WT	1589.22	144.81	3853.00	3613.00	
RES SEAT FORCE	9.87	0.90	3853.00	3613.00	
RES SEAT FORCE / WT	-25.79	-197.57	4158.00	3847.00	20
LF FOOT X	12.60	-70.23	3837.00	3849.00	23
RT FOOT X	-79.42	-297.66	4180.00	3847.00	26
CT FOOT X	-104.14	-558.37	4158.00	3848.00	
TOTAL FOOT X	160.75	-6.95	3833.00	4031.00	21
LF FOOT Y	15.87	-129.67	3893.00	3850.00	24
RT FOOT Y	32.57	-77.78	3800.00	3855.00	27
CT FOOT Y	61.00	-60.61	3891.00	3853.00	
TOTAL FOOT Y	224.57	12.15	3834.00	3790.00	
LF FOOT Z	225.60	27.47	3858.00	4178.00	22
RT FOOT Z	101.27	-121.92	3839.00	3806.00	25
CT FOOT Z	485.08	-26.75	3835.00	3789.00	28
TOTAL FOOT Z	679.80	118.84	3851.00	4178.00	
RES FOOT FORCE					

BRACING STUDY TEST: 467 SUBJ: F-2 WT: 158.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.02	9.98	221.00	1121.00	48
CARRIAGE X	1.68	-1.15	3878.00	3900.00	36
CARRIAGE Y	1.05	-1.07	3874.00	3870.00	31
CARRIAGE Z	12.29	-0.64	3913.00	3833.00	1
CARRIAGE Z (SM)	10.42	-0.17	3914.00	3833.00	
CARRIAGE VEL	-1.33	-26.23	4193.00	3873.00	
SEAT X	1.67	-1.45	3907.00	3899.00	29
SEAT Y	0.91	-1.19	3864.00	3889.00	32
SEAT Z	11.51	-0.20	3919.00	3743.00	33
SEAT Z (SM)	10.42	-0.14	3920.00	3744.00	34
CHEST X	3.53	-2.19	3934.00	3981.00	5
CHEST Y	-0.12	-1.98	3984.00	3928.00	6
CHEST Z	16.31	-0.26	3941.00	3742.00	7
CHEST RES	16.57	0.85	3941.00	3763.00	
CHEST SI	36.38		3861.00	4005.00	
HEAD X	2.74	-2.85	3933.00	3972.00	23
HEAD Y	2.11	0.33	4029.00	3929.00	4
HEAD Z	13.10	-2.37	3935.00	4035.00	
HEAD RES	13.36	1.63	3935.00	4046.00	
HEAD SI	21.32		3891.00	3999.00	
HEAD HIC	17.85		3911.00	3972.00	
SHO REFL LF	22.07	1.44	3975.00	3925.00	
SHO REEL LF	28.74	1.53	3977.00	3929.00	16
LF SHOULDER	50.46	5.13	3977.00	3926.00	
SHO REFL RT	31.81	7.46	3973.00	3918.00	15
SHO REEL RT	37.18	0.67	3971.00	3942.00	17
RT SHOULDER	68.89	11.12	3971.00	3925.00	
TOTAL SHO REFL	53.74	10.73	3975.00	3925.00	
TOTAL SHO REEL	62.86	3.32	3975.00	3930.00	
TOTAL SHOULDER	116.39	16.27	3975.00	3926.00	
TOTAL SHO / WT	0.74	0.10	3975.00	3926.00	
LF LAP BELT	40.95	10.50	4008.00	3997.00	8
RT LAP BELT	59.22	22.36	4014.00	3922.00	9
TOTAL LAP	99.35	33.48	4015.00	3947.00	
TOTAL LAP / WT	0.63	0.21	4015.00	3947.00	
CROTCH STRAP	120.59	-6.52	4019.00	3941.00	1C
LF SEAT LNK X	3.49	-264.98	3719.00	3935.00	18
RT SEAT LNK X	-2.08	-134.89	3644.00	3935.00	19
TOTAL SEAT X	-3.27	-399.88	3602.00	3935.00	
SEAT LNK Y	46.30	-106.05	4045.00	3992.00	35
LF SEAT PAN Z	539.92	36.28	3935.00	3636.00	11
RT SEAT PAN Z	369.78	20.59	3938.00	3605.00	12
CT SEAT PAN Z	676.82	37.26	3938.00	3603.00	13
TOTAL SEAT Z	1581.65	97.39	3938.00	3605.00	
TOTAL SEAT Z / WT	10.01	0.62	3938.00	3605.00	
RES SEAT FORCE	1633.39	98.75	3938.00	3605.00	
RES SEAT FORCE / WT	10.34	0.62	3938.00	3605.00	
LF FOOT X	21.68	-67.83	3881.00	3918.00	
RT FOOT X	90.01	-81.01	3879.00	3931.00	23
CT FOOT X	-7.96	-207.42	3881.00	3931.00	26
TOTAL FOOT X	39.33	-349.93	3881.00	3931.00	
LF FOOT Y	121.22	-8.93	3923.00	3887.00	21
RT FOOT Y	12.28	-159.90	3880.00	3914.00	24
CT FOOT Y	52.86	-22.78	3882.00	4070.00	27
TOTAL FOOT Y	81.35	-75.29	3881.00	3888.00	
LF FOOT Z	172.33	0.62	3940.00	3875.00	22
RT FOOT Z	194.06	8.51	3916.00	3970.00	25
CT FOOT Z	186.96	-91.41	3921.00	3875.00	28
TOTAL FOOT Z	532.23	-52.82	3923.00	3875.00	
RES FOOT FORCE	592.61	98.54	3924.00	4191.00	

BRACING STUDY TEST: 516 SUBJ: F-4 WT: 149.0 G: 10 GP: 2 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.05	9.97	1045.00	1765.00	48
CARRIAGE X	.52	-1.44	3910.00	3904.00	36
CARRIAGE Y	0.94	-0.40	3858.00	3852.00	31
CARRIAGE Z	11.87	-0.17	3904.00	3774.00	1
CARRIAGE Z (SM)	10.89	-0.03	3904.00	3743.00	
CARRIAGE VEL	-1.06	-26.17	4153.00	3860.00	29
SEAT X	2.07	-1.83	3910.00	3904.00	32
SEAT Y	0.82	-0.88	3884.00	3879.00	33
SEAT Z	12.78	-0.24	3913.00	3737.00	34
SEAT Z (SM)	11.33	-0.14	3912.00	3757.00	
CHEST X	3.46	-1.78	3930.00	3968.00	5
CHEST Y	-0.54	-2.37	3962.00	3922.00	6
CHEST Z	15.66	-1.02	3927.00	3759.00	7
CHEST RES	16.17	1.27	3929.00	3854.00	
CHEST SI	29.62		3865.00	3970.00	
HEAD X	0.94	-3.65	3918.00	3952.00	2
HEAD Y	1.95	0.55	3980.00	3927.00	3
HEAD Z	13.90	-1.09	3926.00	3774.00	4
HEAD RES	13.92	0.72	3926.00	3860.00	
HEAD SI	20.90		3873.00	4002.00	
HEAD HIC	16.55		3904.00	3953.00	
SHD REFL LF	35.91	3.60	3978.00	3911.00	14
SHD REEL LF	24.02	2.40	3955.00	3921.00	16
LF SHOULDER	57.56	6.11	3978.00	3911.00	
SHD REFL RT	33.50	7.13	3991.00	3918.00	15
SHD REEL RT	25.16	6.08	3987.00	3905.00	17
RT SHOULDER	57.61	14.74	3988.00	3905.00	
TOTAL SHLD REFL	66.49	12.80	3991.00	3909.00	
TOTAL SHLD REEL	43.20	9.34	3978.00	3904.00	
TOTAL SHO / WT	106.55	22.88	3977.00	3909.00	
TOTAL SHO / WT	0.72	0.15	3977.00	3905.00	
LF LAP BELT	29.08	0.68	3991.00	3927.00	8
RT LAP BELT	37.24	2.84	3984.00	3915.00	9
TOTAL LAP	63.65	6.94	3999.00	3916.00	
TOTAL LAP / WT	0.43	0.05	3999.00	3916.00	
CROTCH STRAP	93.94	2.46	3994.00	3922.00	10
LF SEAT LNK X	32.82	-228.75	3794.00	3924.00	18
RT SEAT LNK X	26.86	-110.26	3870.00	3923.00	19
TOTAL SEAT X	34.93	-338.39	3824.00	3924.00	
SEAT LNK Y	66.48	-98.81	4006.00	3928.00	35
LF SEAT PAN Z	476.50	36.07	3921.00	3623.00	11
RT SEAT PAN Z	439.57	15.80	3918.00	3611.00	12
CT SEAT PAN Z	668.26	42.47	3927.00	3605.00	13
TOTAL SEAT Z	1583.82	108.26	3926.00	3606.00	
TOTAL SEAT Z / WT	10.63	0.73	3926.00	3608.00	
RES SEAT FORCE	1621.16	110.57	3926.00	3608.00	
RES SEAT FORCE / WT	10.88	0.74	3926.00	3608.00	
LF FOOT X	-2.50	-123.65	4009.00	3920.00	20
RT FOOT X	51.97	-40.55	3913.00	3919.00	23
CT FOOT X	-15.94	-173.36	3869.00	3921.00	26
TOTAL FOOT X	-12.54	-333.12	3868.00	3920.00	
LF FOOT Y	128.92	-2.10	3909.00	3991.00	21
RT FOOT Y	21.33	-79.83	3960.00	3906.00	24
CT FOOT Y	0.61	-78.60	4003.00	3909.00	27
TOTAL FOOT Y	56.83	-48.50	3888.00	3917.00	
LF FOOT Z	186.03	-14.82	3908.00	3877.00	22
RT FOOT Z	190.51	11.68	3913.00	4009.00	25
CT FOOT Z	199.16	-112.52	3914.00	3880.00	28
TOTAL FOOT Z	490.65	-57.24	3914.00	3878.00	
RES FOOT FORCE	506.65	50.03	3910.00	4009.00	

BRACING STUDY TEST: 463 SJBJ: G-3 WT: 161.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
IOV EXT PWR	10.02	9.98	542.00	868.00	48
CARRIAGE X	1.59	-1.30	3913.00	3907.00	36
CARRIAGE Y	1.10	-0.64	3913.00	3889.00	31
CARRIAGE Z	12.81	-0.14	3907.00	3723.00	1
CARRIAGE Z (SM)	10.68	-0.06	3907.00	3798.00	
CARRIAGE VEL	-1.21	-26.20	4191.00	3874.00	29
SEAT X	1.16	-1.49	3901.00	3906.00	32
SEAT Y	1.65	-2.03	3872.00	3878.00	33
SEAT Z	11.62	-0.18	3913.00	3765.00	34
SEAT Z (SM)	10.66	-0.08	3914.00	3734.00	
CHEST X	4.20	-1.96	3927.00	3972.00	5
CHEST Y	-0.22	-2.29	3995.00	3939.00	6
CHEST Z	21.87	-0.95	3940.00	3780.00	7
CHEST RES	22.06	1.04	3940.00	3682.00	
CHEST SI	42.58		3873.00	3987.00	
HEAD X	2.26	-4.57	3924.00	3977.00	2
HEAD Y	2.95	1.00	4023.00	3956.00	3
HEAD Z	11.80	-1.63	3923.00	3741.00	4
HEAD RES	12.17	1.99	3924.00	4081.00	
HEAD SI	16.57		3885.00	3999.00	
HEAD HIC	13.16		3899.00	3984.00	
SHD REFL LF	38.39	6.83	3955.00	3920.00	14
SHD REEL LF	67.92	4.43	3958.00	4050.00	16
LF SHOULDER	105.38	15.56	3957.00	4053.00	
SHD REFL RT	32.85	11.07	3968.00	3908.00	15
SHD REEL RT	52.75	1.24	3965.00	4057.00	17
RT SHOULDER	85.15	15.13	3966.00	4059.00	
TOTAL SHD REFL	68.81	20.20	3962.00	3920.00	
TOTAL SHD REEL	115.75	6.04	3964.00	4049.00	
TOTAL SHOULDER	184.29	31.43	3963.00	4053.00	
TOTAL SHD / WT	1.14	0.20	3963.00	4053.00	
LF LAP BELT	58.99	21.42	3996.00	3933.00	8
RT LAP BELT	61.78	23.35	4007.00	3916.00	9
TOTAL LAP	120.59	45.24	4007.00	3916.00	
TOTAL LAP / WT	0.75	0.28	4007.00	3916.00	
CROTCH STRAP	46.17	-25.71	4013.00	3922.00	10
LF SEAT LNK X	19.93	-170.19	4131.00	3928.00	18
RT SEAT LNK X	23.33	-92.88	3863.00	3921.00	19
TOTAL SEAT X	24.89	-263.07	3601.00	3928.00	
SEAT LNK Y	39.16	-73.87	3997.00	3927.00	35
LF SEAT PAN Z	594.75	57.77	3930.00	3600.00	11
RT SEAT PAN Z	566.16	41.44	3931.00	3634.00	12
CT SEAT PAN Z	620.19	52.26	3930.00	3610.00	13
TOTAL SEAT Z	1778.35	156.37	3930.00	3602.00	
TOTAL SEAT Z / WT	11.05	0.97	3930.00	3602.00	
RES SEAT FORCE	1797.70	158.42	3930.00	3602.00	
RES SEAT FORCE / WT	11.17	0.98	3930.00	3602.00	
LF FOOT X	25.26	-89.56	3874.00	3934.00	20
RT FOOT X	36.18	-48.41	3913.00	3934.00	23
CT FOOT X	44.70	-169.96	3875.00	3935.00	26
TOTAL FOOT X	99.92	-305.25	3874.00	3934.00	
LF FOOT Y	108.38	-6.04	3909.00	3866.00	21
RT FOOT Y	27.71	-95.65	3893.00	3917.00	24
CT FOOT Y	9.81	-56.94	4015.00	3926.00	27
TOTAL FOOT Y	71.25	-73.03	3894.00	3926.00	
LF FOOT Z	165.08	-57.42	3933.00	3867.00	22
RT FOOT Z	159.81	-17.34	3934.00	4008.00	25
CT FOOT Z	150.11	-80.52	3929.00	3884.00	
TOTAL FOOT Z	372.91	-120.99	3928.00	3866.00	
RES FOOT FORCE	471.78	12.24	3934.00	3985.00	

BRACING STUDY TEST: 465 SUBJ: G-2 WT: 118.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.02	9.98	73.00	312.00	48
CARRIAGE X	1.08	-1.16	3851.00	3897.00	36
CARRIAGE Y	0.87	-0.59	3843.00	3866.00	31
CARRIAGE Z	12.51	-0.20	3883.00	3656.00	1
CARRIAGE Z (SM)	10.48	-0.08	3883.00	3656.00	
CARRIAGE VEL	-1.18	-26.17	4167.00	3837.00	29
SEAT X	1.40	-1.35	3849.00	3896.00	32
SEAT Y	0.38	-0.89	3885.00	3856.00	33
SEAT Z	11.94	-0.23	3889.00	3694.00	34
SEAT Z (SM)	10.63	-0.15	3890.00	3692.00	
CHEST X	3.33	-2.07	3901.00	3960.00	5
CHEST Y	0.03	-1.61	3962.00	3945.00	6
CHEST Z	14.91	-1.09	3920.00	3818.00	7
CHEST RES	14.94	0.75	3920.00	3844.00	
CHEST SI	28.03		3849.00	3979.00	
HEAD X	0.48	-3.35	3842.00	3945.00	2
HEAD Y	1.86	0.81	3966.00	3910.00	34
HEAD Z	12.40	-1.38	3906.00	3710.00	
HEAD RES	12.43	1.34	3907.00	4173.00	
HEAD SI	17.74		3857.00	3974.00	
HEAD HIC	14.66		3884.00	3947.00	
SHO REFL LF	16.08	4.23	3933.00	3901.00	14
SHO REEL LF	21.90	4.31	3967.00	3922.00	16
LF SHOULDER	32.41	8.81	3965.00	3901.00	
SHO REFL RT	26.65	11.31	3967.00	4029.00	15
SHO REEL RT	23.37	1.20	3950.00	3908.00	17
RT SHOULDER	46.96	15.19	3951.00	4043.00	
TOTAL SHLD REFL	37.22	15.88	3965.00	4027.00	
TOTAL SHLD REEL	39.83	6.11	3955.00	3901.00	
TOTAL SHOULDER	75.90	25.36	3956.00	4047.00	
TOTAL SHD / WT	0.64	0.21	3956.00	4047.00	
LF LAP BELT	26.22	3.58	3972.00	3891.00	8
RT LAP BELT	25.08	3.07	3972.00	3890.00	9
TOTAL LAP	51.31	6.77	3972.00	3891.00	
TOTAL LAP / WT	0.43	0.06	3972.00	3891.00	
CROTCH STRAP	73.26	5.89	3973.00	3910.00	10
LF SEAT LNK X	42.21	-120.84	3820.00	3903.00	18
RT SEAT LNK X	44.32	-15.32	3848.00	3913.00	19
TOTAL SEAT X	64.47	-134.93	3824.00	3908.00	
SEAT LNK Y	38.05	-26.97	3958.00	3895.00	35
LF SEAT PAN Z	338.78	37.74	3898.00	4156.00	11
RT SEAT PAN Z	338.05	26.92	3903.00	3742.00	12
CT SEAT PAN Z	528.51	29.22	3906.00	3615.00	13
TOTAL SEAT Z	1192.31	101.99	3903.00	3608.00	
TOTAL SEAT Z / WT	10.10	0.86	3903.00	3608.00	
RES SEAT FORCE	1200.05	113.37	3903.00	3608.00	
RES SEAT FORCE / WT	10.17	0.96	3903.00	3608.00	
LF FOOT X	6.22	-72.44	3950.00	3897.00	20
RT FOOT X	11.45	-77.54	3849.00	3900.00	23
CT FOOT X	-40.71	-207.08	3852.00	3900.00	26
TOTAL FOOT X	-35.40	-355.25	3852.00	3900.00	
LF FOOT Y	123.05	-9.71	3885.00	3951.00	21
RT FOOT Y	14.98	-133.43	3851.00	3885.00	24
CT FOOT Y	21.27	-24.12	3866.00	4037.00	27
TOTAL FOOT Y	47.19	-66.83	3851.00	3857.00	
LF FOOT Z	165.88	1.99	3886.00	4030.00	22
RT FOOT Z	184.84	8.19	3886.00	4004.00	25
CT FOOT Z	108.11	-90.36	3891.00	3859.00	28
TOTAL FOOT Z	395.33	-16.06	3886.00	3843.00	
RES FOOT FORCE	483.33	49.13	3886.00	4182.00	

BRACING STUDY TEST: 524 SUBJ: H-3 WT: 186.0 G: 10 GP: 2 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
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IOV EXT PWR	10.05	9.96	545.00	1422.00	48
CARRIAGE X	0.83	-1.12	3869.00	3862.00	36
CARRIAGE Y	0.79	-0.85	3992.00	3997.00	31
CARRIAGE Z	11.31	-0.22	3865.00	3776.00	1
CARRIAGE Z (SM)	10.64	-0.07	3864.00	3775.00	
CARRIAGE VEL	-1.22	-25.87	4159.00	3807.00	29
SEAT X	1.08	-1.03	3822.00	3862.00	32
SEAT Y	0.99	-0.86	3997.00	4021.00	33
SEAT Z	11.68	-0.17	3870.00	3674.00	34
SEAT Z (SM)	11.04	-0.12	3871.00	3675.00	
CHEST X	4.28	-3.31	3883.00	3940.00	5
CHEST Y	0.22	-1.92	3956.00	3918.00	6
CHEST Z	17.56	-1.25	3887.00	3933.00	7
CHEST RES	17.98	0.54	3887.00	3669.00	
CHEST SI	36.85		3823.00	3950.00	
HEAD X	3.05	-2.92	3880.00	3940.00	2
HEAD Y	2.02	-0.11	4132.00	3880.00	3
HEAD Z	11.37	-1.28	3883.00	3660.00	4
HEAD RES	11.76	1.17	3883.00	3966.00	
HEAD SI	19.03		3835.00	3953.00	
HEAD MIC	16.56		3858.00	3924.00	
SHO REFL LF	44.39	0.31	3953.00	3871.00	14
SHO REEL LF	52.59	-2.50	3934.00	4025.00	16
LF SHOULDER	81.87	3.96	3936.00	3872.00	
SHO REFL RT	45.64	4.90	3940.00	4017.00	15
SHO REEL RT	66.58	-3.68	3930.00	3872.00	17
RT SHOULDER	103.83	3.88	3931.00	3872.00	
TOTAL SHO REFL	87.34	7.79	3953.00	3873.00	
TOTAL SHO REEL	113.38	-1.32	3931.00	4013.00	
TOTAL SHOULDER	178.60	7.84	3935.00	3872.00	
TOTAL SHO / WT	0.96	0.04	3935.00	3872.00	
LF LAP BELT	37.98	16.39	3955.00	3904.00	8
RT LAP BELT	54.81	21.34	3950.00	3869.00	9
TOTAL LAP	69.02	38.78	3954.00	3869.00	
TOTAL LAP / WT	0.48	0.21	3954.00	3869.00	
CROTCH STRAP	136.90	-26.75	3949.00	3878.00	10
LF SEAT LNK X	38.92	-182.89	3814.00	3879.00	18
RT SEAT LNK X	67.78	-87.78	3934.00	3868.00	19
TOTAL SEAT X	74.06	-267.21	3950.00	3888.00	
SEAT LNK Y	77.55	-18.46	3952.00	3877.00	35
LF SEAT PAN Z	363.11	19.48	3879.00	3604.00	11
RT SEAT PAN Z	557.62	28.97	3888.00	3643.00	12
CT SEAT PAN Z	899.85	56.58	3884.00	3626.00	13
TOTAL SEAT Z	1808.15	121.36	3887.00	3642.00	
TOTAL SEAT Z / WT	9.72	0.65	3887.00	3642.00	
RES SEAT FORCE	1827.47	123.54	3887.00	3642.00	
RES SEAT FORCE / WT	9.83	0.66	3887.00	3642.00	
LF FOOT X	0.13	-138.20	3826.00	3885.00	20
RT FOOT X	14.96	-77.56	3826.00	3902.00	23
CT FOOT X	-0.75	-230.62	3827.00	3886.00	26
TOTAL FOOT X	12.53	-434.90	3827.00	3885.00	
LF FOOT Y	123.44	-5.83	3894.00	3958.00	21
RT FOOT Y	33.76	-103.79	3920.00	3869.00	24
CT FOOT Y	22.77	-57.33	3997.00	3882.00	27
TOTAL FOOT Y	49.85	-52.34	3920.00	3871.00	
LF FOOT Z	180.82	8.58	3868.00	4018.00	22
RT FOOT Z	206.45	-4.42	3894.00	3991.00	25
CT FOOT Z	207.87	-65.59	3872.00	3818.00	28
TOTAL FOOT Z	539.15	-42.52	3894.00	3817.00	
RES FOOT FORCE	672.39	69.12	3894.00	3677.00	

BRACING STUDY TEST: 520 SUBJ: H-5 WT: 136.0 G: 10 GP: 2 CELL: C

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.05	9.96	1509.00	3087.00	48
CARRIAGE X	1.39	-1.63	3868.00	3884.00	36
CARRIAGE Y	0.76	-0.75	3941.00	3852.00	31
CARRIAGE Z	11.14	-0.29	3908.00	3620.00	1
CARRIAGE Z (SM)	10.70	-0.15	3909.00	3619.00	
CARRIAGE VEL	-1.34	-25.99	4177.00	3866.00	29
SEAT X	2.17	-1.75	3868.00	3884.00	32
SEAT Y	0.54	-1.14	3867.00	3872.00	33
SEAT Z	12.18	-0.18	3915.00	3717.00	34
SEAT Z (SM)	11.22	-0.14	3915.00	3718.00	
CHEST X	1.35	-3.19	3998.00	3967.00	5
CHEST Y	-0.18	-2.43	3982.00	3939.00	6
CHEST Z	15.73	-0.65	3921.00	3867.00	7
CHEST RES	15.78	0.68	3921.00	3737.00	
CHEST SI	29.33		3869.00	4137.00	
HEAD X	2.53	-2.32	3920.00	3963.00	2
HEAD Y	3.30	1.29	3990.00	3881.00	3
HEAD Z	13.12	-1.36	3932.00	3639.00	4
HEAD RES	13.48	1.56	3932.00	4171.00	
HEAD SI	21.82		3879.00	4010.00	
HEAD HIC	17.86		3900.00	3962.00	
SHD REFL LF	41.75	10.89	3980.00	3909.00	14
SHD REEL LF	59.97	13.61	3950.00	3910.00	16
LF SHOULDER	68.97	24.78	3952.00	3910.00	
SHD REFL RT	38.32	14.77	3939.00	3909.00	15
SHD REEL RT	56.03	13.92	3945.00	4043.00	17
RT SHOULDER	93.94	35.95	3945.00	3909.00	
TOTAL SHLD REFL	69.00	25.66	3981.00	3909.00	
TOTAL SHLD REEL	114.10	34.62	3951.00	3911.00	
TOTAL SHOULDER	161.18	60.90	3946.00	3909.00	
TOTAL SHD / WT	1.33	0.45	3946.00	3909.00	
LF LAP BELT	39.72	3.09	4010.00	3921.00	8
RT LAP BELT	47.45	3.38	4011.00	3914.00	9
TOTAL LAP	87.04	8.63	4011.00	3920.00	
TOTAL LAP / WT	0.64	0.06	4011.00	3920.00	
CROTCH STRAP	74.30	8.10	4013.00	3923.00	10
LF SEAT LNK X	40.36	-160.71	4164.00	3922.00	18
RT SEAT LNK X	45.71	-48.53	3965.00	3922.00	19
TOTAL SEAT X	47.30	-209.23	3868.00	3922.00	
SEAT LNK Y	56.93	-28.75	3983.00	3915.00	35
LF SEAT PAN Z	314.34	19.94	3926.00	3615.00	11
RT SEAT PAN Z	348.76	17.32	3924.00	3746.00	12
CT SEAT PAN Z	777.13	59.37	3927.00	3696.00	13
TOTAL SEAT Z	1434.31	117.62	3926.00	3615.00	
TOTAL SEAT Z / WT	10.55	0.86	3926.00	3615.00	
RES SEAT FORCE	1447.76	121.63	3926.00	3615.00	
RES SEAT FORCE / WT	10.65	0.89	3926.00	3615.00	
LF FOOT X	-12.26	-145.17	3687.00	3930.00	20
RT FOOT X	21.71	-61.12	3894.00	3929.00	23
CT FOOT X	-46.60	-212.07	3868.00	3930.00	26
TOTAL FOOT X	-66.52	-414.75	3868.00	3929.00	
LF FOOT Y	124.49	-3.91	3921.00	4084.00	21
RT FOOT Y	23.45	-109.67	3959.00	3913.00	24
CT FOOT Y	7.21	-54.20	3875.00	3979.00	27
TOTAL FOOT Y	42.14	-40.09	3876.00	3993.00	
LF FOOT Z	200.44	0.30	3919.00	3883.00	22
RT FOOT Z	189.48	-5.66	3915.00	3865.00	25
CT FOOT Z	121.17	-154.99	3895.00	3667.00	
TOTAL FOOT Z	474.70	-91.27	3918.00	3864.00	
RES FOOT FORCE	595.09	108.26	3921.00	3866.00	

BRACING STUDY TEST: 526 SUBJ: H-4 WT: 190.0 G: 10 GP: 2 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.05	9.96	1696.00	150.00	48
CARRIAGE X	1.59	-0.99	3911.00	3877.00	36
CARRIAGE Y	0.82	-0.94	3928.00	3851.00	31
CARRIAGE Z	11.36	-0.22	3905.00	3636.00	1
CARRIAGE Z (SM)	10.87	-0.09	3904.00	3614.00	
CARRIAGE VEL	-0.92	-26.19	4186.00	3870.00	29
SEAT X	1.89	-1.62	3867.00	3878.00	32
SEAT Y	0.60	-0.91	3938.00	3928.00	93
SEAT Z	11.66	-0.18	3913.00	3802.00	34
SEAT Z (SM)	11.02	-0.11	3912.00	3716.00	
CHEST X	2.42	-2.33	3921.00	3983.00	5
CHEST Y	0.21	-2.80	3985.00	3929.00	6
CHEST Z	16.35	-1.09	3934.00	3730.00	7
CHEST RES	16.55	1.10	3934.00	3747.00	
CHEST SI	28.27		3867.00	3995.00	
HEAD X	3.96	-1.55	3926.00	3965.00	2
HEAD Y	2.40	-0.12	3978.00	3947.00	3
HEAD Z	13.43	-1.18	3928.00	3800.00	4
HEAD RES	14.01	0.76	3928.00	4128.00	
HEAD SI	22.65		3873.00	4003.00	
HEAD HIC	18.27		3898.00	3964.00	
SHD REFL LF	33.96	3.49	3968.00	4063.00	14
SHD REEL LF	51.62	4.23	3959.00	4029.00	16
LF SHOULDER	79.30	14.30	3959.00	3907.00	
SHD REFL RT	27.71	8.86	3998.00	3916.00	15
SHD REEL RT	53.95	6.12	3978.00	4018.00	17
RT SHOULDER	53.39	18.31	3983.00	3912.00	
TOTAL SHLD REFL	58.54	14.74	3991.00	4063.00	
TOTAL SHLD REEL	72.39	11.73	3961.00	4026.00	
TOTAL SHO / WT	121.80	34.24	3966.00	3909.00	
LF LAP BELT	0.64	0.18	3966.00	3909.00	
RT LAP BELT	48.69	33.83	4011.00	4090.00	8
TOTAL LAP	65.03	32.60	3991.00	3903.00	9
TOTAL LAP / WT	112.21	68.69	3991.00	3903.00	
CROTCH STRAP	0.59	0.36	3991.00	3803.00	
LF SEAT LNK X	113.95	-41.60	4015.00	3923.00	10
RT SEAT LNK X	18.45	-182.52	3628.00	3924.00	18
TOTAL SEAT X	38.58	-104.07	3973.00	3918.00	19
SEAT LNK Y	13.26	-281.51	3699.00	3918.00	
LF SEAT PAN Z	28.32	-71.34	3846.00	3959.00	35
RT SEAT PAN Z	419.17	37.90	3929.00	3608.00	11
CT SEAT PAN Z	758.93	75.37	3927.00	3603.00	12
TOTAL SEAT Z	728.07	75.07	3925.00	3821.00	13
TOTAL SEAT Z / WT	1875.79	196.45	3925.00	3603.00	
RES SEAT FORCE	9.87	1.03	3925.00	3603.00	
RES SEAT FORCE / WT	1896.95	196.97	3925.00	3603.00	
LF FOOT X	9.98	1.04	3925.00	3603.00	
RT FOOT X	-53.07	-211.19	4196.00	3919.00	20
CT FOOT X	19.86	-122.89	3897.00	3920.00	23
TOTAL FOOT X	-54.60	-272.83	4198.00	3923.00	26
LF FOOT Y	-90.14	-590.72	4163.00	3920.00	
RT FOOT Y	161.80	-3.28	3909.00	4144.00	21
CT FOOT Y	27.76	-117.78	4039.00	3917.00	24
TOTAL FOOT Y	10.07	-69.13	3671.00	3920.00	27
LF FOOT Z	44.27	-39.33	3941.00	3987.00	
RT FOOT Z	267.96	36.30	3918.00	4186.00	22
CT FOOT Z	235.80	16.60	3909.00	3871.00	25
TOTAL FOOT Z	114.62	-106.44	3915.00	3881.00	
RES FOOT FORCE	596.79	33.40	3909.00	3852.00	28
	753.35	114.22	3931.00	4163.00	

BRACING STUDY TEST: 458 SUBJ: K-1 WT: 183.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
ICV EXT PWR	10.02	9.98	103.00	11.00	48
CARRIAGE X	1.36	-0.89	3797.00	3810.00	36
CARRIAGE Y	0.89	-0.63	3877.00	3811.00	31
CARRIAGE Z	12.22	-0.20	3829.00	3677.00	1
CARRIAGE Z (SM)	10.30	-0.08	3829.00	3677.00	
CARRIAGE VEL	-0.84	-24.33	4073.00	3802.00	29
SEAT X	1.63	-1.16	3798.00	3809.00	32
SEAT Y	1.02	-1.21	3794.00	3799.00	33
SEAT Z	11.05	-0.12	3834.00	3642.00	34
SEAT Z (SM)	10.42	-0.07	3836.00	3671.00	5
CHEST X	4.58	-1.12	3849.00	3896.00	6
CHEST Y	-0.13	-2.26	3820.00	3886.00	7
CHEST Z	15.98	-0.16	3863.00	3646.00	
CHEST RES	16.43	0.66	3863.00	3659.00	
CHEST SI	35.31		3793.00	4076.00	
HEAD X	1.43	-4.46	3837.00	3884.00	2
HEAD Y	2.87	1.56	3912.00	3849.00	3
HEAD Z	11.22	-1.89	3852.00	3676.00	4
HEAD RES	11.41	2.29	3852.00	3936.00	
HEAD SI	16.66		3817.00	3918.00	
HEAD MIC	14.06		3824.00	3894.00	
SHO REFL LF	20.49	0.94	3927.00	3841.00	14
SHO REFL LF	21.49	4.20	3913.00	3967.00	16
LF SHOULDER	41.34	6.14	3922.00	3841.00	
SHO REFL RT	41.20	12.46	3919.00	3984.00	15
SHO REFL RT	45.92	0.89	3884.00	3845.00	17
RT SHOULDER	60.99	14.08	3884.00	3842.00	
TOTAL SHO REFL	61.26	13.83	3925.00	3841.00	
TOTAL SHO REEL	57.45	5.22	3884.00	3846.00	
TOTAL SHOULDER	109.17	20.23	3884.00	3841.00	
TOTAL SHD / WT	0.60	0.11	3884.00	3841.00	8
LF LAP BELT	37.80	14.33	3915.00	3998.00	9
RT LAP BELT	35.90	17.69	3916.00	3971.00	
TOTAL LAP	73.62	33.20	3915.00	3998.00	
TOTAL LAP / WT	0.40	0.18	3915.00	3998.00	
CROTCH STRAP	144.67	-47.38	3925.00	3851.00	10
LF SEAT LNK X	16.60	-163.15	4088.00	3848.00	16
RT SEAT LNK X	10.91	-155.72	3787.00	3854.00	19
TOTAL SEAT X	17.14	-316.57	4082.00	3854.00	
SEAT LNK Y	20.82	-70.94	3913.00	3848.00	35
LF SEAT PAN Z	707.63	69.60	3852.00	4082.00	11
RT SEAT PAN Z	767.15	55.43	3854.00	3609.00	12
CT SEAT PAN Z	687.74	38.54	3856.00	3604.00	13
TOTAL SEAT Z	2158.72	183.21	3854.00	3603.00	
TOTAL SEAT Z / WT	11.80	1.00	3854.00	3603.00	
RES SEAT FORCE	2182.88	183.44	3854.00	3603.00	
RES SEAT FORCE / WT	11.93	1.00	3854.00	3603.00	
LF FOOT X	14.23	-80.70	3796.00	3847.00	20
RT FOOT X	28.36	-22.75	3799.00	3846.00	23
CT FOOT X	9.19	-148.22	3795.00	3847.00	26
TOTAL FOOT X	47.38	-249.91	3795.00	3847.00	
LF FOOT Y	100.99	-3.83	3831.00	3926.00	21
RT FOOT Y	24.44	-77.61	3816.00	3831.00	24
CT FOOT Y	13.78	-51.19	3881.00	3858.00	27
TOTAL FOOT Y	68.06	-60.42	3818.00	3859.00	
LF FOOT Z	134.32	-33.15	3856.00	3788.00	22
RT FOOT Z	141.94	-33.89	3831.00	3886.00	25
CT FOOT Z	168.24	-35.46	3861.00	3808.00	
TOTAL FOOT Z	362.56	-49.25	3831.00	3788.00	28
RES FOOT FORCE	398.06	20.06	3855.00	3643.00	

BRACING STUDY TEST: 469 SUBJ: M-2 WT: 175.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
IOV EXT PWR	10.02	9.98	3822.00	3827.00	48
CARRIAGE X	1.64	-1.22	3819.00	3841.00	36
CARRIAGE T	0.73	-0.84	3826.00	3841.00	31
CARRIAGE Z	11.87	-0.39	3854.00	3820.00	1
CARRIAGE Z (SM)	10.19	-0.10	3855.00	3753.00	1
CARRIAGE VEL	-1.24	-26.20	4161.00	3822.00	29
SEAT X	1.99	-1.29	3825.00	3867.00	32
SEAT Y	1.34	-2.03	3822.00	3827.00	33
SEAT Z	11.44	-0.22	3860.00	3662.00	34
SEAT Z (SM)	10.33	-0.12	3861.00	3662.00	1
CHEST X	1.83	-2.51	3861.00	3914.00	5
CHEST Y	0.10	-1.38	3867.00	3861.00	7
CHEST Z	18.66	-0.35	3891.00	3794.00	1
CHEST RES	18.75	0.65	3891.00	3775.00	1
CHEST SI	32.05		3821.00	3961.00	1
HEAD X	1.12	-5.15	3862.00	3907.00	2
HEAD Y	1.49	-0.14	3950.00	3881.00	3
HEAD Z	11.46	-0.56	3875.00	3622.00	4
HEAD RES	11.47	0.83	3875.00	4200.00	1
HEAD SI	18.64		3827.00	4086.00	1
HEAD HIC	14.06		3843.00	3931.00	1
SHD REFL LF	33.04	6.38	3945.00	3858.00	14
SHD REEL LF	35.97	4.30	3922.00	3865.00	16
LF SHOULDER	64.49	11.60	3922.00	3857.00	1
SHD REFL RT	29.71	12.23	3905.00	3855.00	15
SHD REEL RT	41.26	4.55	3907.00	3868.00	17
RT SHOULDER	70.83	17.74	3907.00	3857.00	1
TOTAL SHLD REFL	57.48	18.94	3944.00	3858.00	1
TOTAL SHLD REEL	69.27	9.34	3910.00	3867.00	1
TOTAL SHOULDER	121.85	29.34	3910.00	3857.00	1
TOTAL SHD / WT	0.70	0.17	3910.00	3857.00	1
LF LAP BELT	28.71	4.13	4097.00	3893.00	8
RT LAP BELT	43.25	14.02	3964.00	3864.00	9
TOTAL LAP	69.81	19.63	3966.00	3893.00	1
TOTAL LAP / WT	0.40	0.11	3966.00	3893.00	1
CROTCH STRAP	105.62	-0.78	3952.00	3880.00	10
LF SEAT LNK X	24.58	-176.49	4171.00	3877.00	18
RT SEAT LNK X	1.54	-133.74	3826.00	3876.00	19
TOTAL SEAT X	11.05	-308.50	3945.00	3876.00	1
SEAT LNK Y	87.16	-54.37	3948.00	3868.00	35
LF SEAT PAN Z	408.63	53.89	3876.00	3622.00	11
RT SEAT PAN Z	428.79	44.80	3878.00	3604.00	12
CT SEAT PAN Z	921.87	71.32	3879.00	3668.00	13
TOTAL SEAT Z	1749.54	175.25	3878.00	3604.00	1
TOTAL SEAT Z / WT	10.00	1.00	3878.00	3604.00	1
RES SEAT FORCE	1776.34	175.39	3878.00	3604.00	1
RES SEAT FORCE / WT	10.15	1.00	3878.00	3604.00	1
LF FOOT X	24.97	-79.91	3822.00	3867.00	20
RT FOOT X	21.54	-83.32	3850.00	3882.00	23
CT FOOT X	0.43	-228.54	3823.00	3868.00	26
TOTAL FOOT X	41.61	-375.88	3822.00	3867.00	1
LF FOOT Y	116.97	-8.80	3856.00	3801.00	21
RT FOOT Y	14.84	-136.03	3914.00	3874.00	24
CT FOOT Y	43.48	-46.40	3822.00	3867.00	27
TOTAL FOOT Y	60.70	-82.20	3822.00	3871.00	1
LF FOOT Z	195.07	-31.81	3846.00	3815.00	22
RT FOOT Z	204.07	-16.40	3873.00	3835.00	25
CT FOOT Z	200.11	-97.84	3877.00	3816.00	28
TOTAL FOOT Z	484.36	-108.52	3877.00	3815.00	1
RES FOOT FORCE	574.03	74.79	3875.00	4084.00	1

BRACING STUDY TEST: 466 SUBJ: MIG WT: 148.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.02	9.98	149.00	965.00	48
CARRIAGE X	1.49	-0.99	3844.00	3852.00	36
CARRIAGE T	0.86	-0.50	3836.00	3859.00	31
CARRIAGE Z	12.18	-0.14	3876.00	3617.00	1
CARRIAGE Z (SM)	10.46	-0.08	3877.00	3619.00	
CARRIAGE VEL	-1.23	-26.22	4179.00	3837.00	29
SEAT X	1.39	-1.45	3845.00	3890.00	32
SEAT Y	0.98	-0.93	3842.00	3849.00	33
SEAT Z	11.90	-0.13	3882.00	3609.00	34
SEAT Z (SM)	10.71	-0.07	3883.00	3610.00	5
CHEST X	3.20	-1.45	3895.00	3923.00	6
CHEST Y	-0.12	-2.54	3876.00	3892.00	7
CHEST Z	16.63	0.86	3898.00	3748.00	
CHEST RES	31.63		3898.00	3709.00	
CHEST SI	1.61	-2.55	3896.00	3916.00	2
HEAD X	1.82	-1.27	3936.00	4009.00	34
HEAD Y	12.59	-0.50	3893.00	3641.00	
HEAD Z	12.79	0.92	3893.00	3624.00	
HEAD RES	22.85		3845.00	4099.00	
HEAD SI	18.54		3868.00	3936.00	
HEAD HIC	23.25	1.62	3929.00	3879.00	14
SHO REFL LF	36.46	6.50	3933.00	3978.00	16
SHO REEL LF	58.43	10.60	3933.00	3879.00	
LF SHOULDER	27.23	8.14	3956.00	3876.00	15
SHO REFL RT	26.18	2.64	3934.00	3976.00	17
SHO REEL RT	48.04	12.40	3935.00	3877.00	
RT SHOULDER	46.58	10.03	3945.00	3879.00	
TOTAL SHO REFL	62.54	9.36	3934.00	3978.00	
TOTAL SHO REEL	106.31	23.48	3934.00	3879.00	
TOTAL SHOULDER	0.72	0.16	3934.00	3879.00	
TOTAL SHO / WT	34.93	11.47	3969.00	3876.00	8
LF LAP BELT	33.09	9.70	3979.00	3884.00	9
RT LAP BELT	67.60	22.40	3978.00	3876.00	
TOTAL LAP	0.46	0.15	3978.00	3876.00	
TOTAL LAP / WT	82.79	21.34	3967.00	3910.00	10
CROTCH STRAP	34.76	-178.98	4104.00	3891.00	18
LF SEAT LNK X	4.83	-94.78	3841.00	3891.00	19
RT SEAT LNK X	25.69	-273.76	4174.00	3891.00	
TOTAL SEAT X	40.86	-66.09	3950.00	3889.00	35
SEAT LNK Y	413.64	24.16	3891.00	3657.00	11
LF SEAT PAN Z	348.60	22.04	3891.00	3628.00	12
RT SEAT PAN Z	845.42	54.54	3897.00	3619.00	13
CT SEAT PAN Z	1586.88	107.32	3894.00	3628.00	
TOTAL SEAT Z	10.72	0.73	3894.00	3628.00	
TOTAL SEAT Z / WT	1609.17	108.37	3894.00	3628.00	
RES SEAT FORCE	10.87	0.73	3894.00	3628.00	
RES SEAT FORCE / WT	17.25	-122.89	3845.00	3891.00	20
LF FOOT X	31.40	-50.54	3871.00	3891.00	23
RT FOOT X	21.54	-202.96	3845.00	3891.00	26
CT FOOT X	59.62	-376.39	3845.00	3891.00	
TOTAL FOOT X	118.53	-8.12	3878.00	3835.00	21
LF FOOT Y	27.35	-96.00	3845.00	3893.00	24
RT FOOT Y	8.01	-67.64	3715.00	3896.00	27
CT FOOT Y	43.87	-66.75	3864.00	3893.00	
TOTAL FOOT Y	141.31	-28.52	3902.00	3837.00	22
LF FOOT Z	167.20	-7.35	3891.00	3955.00	25
RT FOOT Z	148.71	-86.40	3884.00	3854.00	28
CT FOOT Z	384.16	-77.63	3887.00	3836.00	
TOTAL FOOT Z	472.25	46.16	3896.00	3954.00	
RES FOOT FORCE					

BRACING STUDY TEST: 460 SUBJ: MII WT: 160.0 G: 10 GP: I CELL: G  
 DATA ID MAX MIN T1 T2 CH  
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 IOW EXT PWR 10.02 9.98 53.00 1401.00 48  
 CARRIAGE X 1.38 -1.02 3792.00 3825.00 36  
 CARRIAGE Y 0.95 -0.81 3842.00 3807.00 31  
 CARRIAGE Z 12.27 -0.15 3825.00 3659.00 1  
 CARRIAGE Z (SM) 10.46 -0.06 3825.00 3670.00  
 CARRIAGE VEL -1.25 -26.18 4168.00 3787.00 29  
 SEAT X 2.28 -1.17 3793.00 3837.00 32  
 SEAT Y 0.74 -1.24 3807.00 3798.00 33  
 SEAT Z 11.28 -0.17 3830.00 3650.00 34  
 SEAT Z (SM) 10.57 -0.06 3832.00 3651.00  
 CHEST X 3.93 -2.30 3843.00 3888.00 5  
 CHEST Y 0.59 -1.05 3883.00 3798.00  
 CHEST Z 16.84 -0.42 3849.00 3883.00  
 CHEST RES 17.20 0.55 3849.00 3712.00  
 CHEST SI 35.47 3787.00 3831.00  
 HEAD X 1.52 -3.86 3838.00 3884.00 23  
 HEAD Y 2.07 0.42 3896.00 3858.00 34  
 HEAD Z 12.26 -1.87 3845.00 4025.00  
 HEAD RES 12.36 0.95 3845.00 4082.00  
 HEAD SI 16.62 3801.00 3961.00  
 HEAD HIC 14.84 3819.00 3886.00  
 SHO REFL LF 27.30 3.40 3883.00 3833.00 14  
 SHO REEL LF 36.33 4.79 3882.00 3936.00 16  
 LF SHOULDER 63.61 10.02 3882.00 3833.00  
 SHO REFL RT 32.39 6.33 4011.00 3829.00 15  
 SHO REEL RT 29.57 2.59 3893.00 3844.00 17  
 RT SHOULDER 48.15 10.91 3894.00 3835.00  
 TOTAL SHO REFL 52.19 10.45 3917.00 3632.00  
 TOTAL SHO REEL 62.06 8.12 3883.00 3842.00  
 TOTAL SHOULDER 107.22 21.48 3883.00 3833.00  
 LF LAP BELT 0.67 0.13 3883.00 3833.00  
 RT LAP BELT 30.88 6.39 4082.00 3825.00 8  
 TOTAL LAP 39.50 11.52 3923.00 3827.00 9  
 TOTAL LAP / WT 68.24 18.01 3932.00 3826.00  
 CROTCH STRAP 0.42 0.11 3932.00 3826.00  
 LF SEAT LNK X 118.66 -13.35 4036.00 3843.00 10  
 RT SEAT LNK X 12.42 -221.49 4190.00 3847.00 18  
 TOTAL SEAT X 6.22 -119.21 3794.00 3844.00 19  
 SEAT LNK Y -6.91 -340.70 3603.00 3847.00  
 LF SEAT PAN Z 516.41 38.26 3849.00 3606.00 35  
 RT SEAT PAN Z 467.73 32.48 3849.00 3645.00 11  
 CT SEAT PAN Z 751.20 41.95 3849.00 3613.00 12  
 TOTAL SEAT Z 1735.34 120.94 3849.00 3606.00 13  
 TOTAL SEAT Z / WT 10.85 0.76 3849.00 3606.00  
 RES SEAT FORCE 1767.23 122.20 3849.00 3606.00  
 RES SEAT FORCE / WT 11.05 0.76 3849.00 3606.00  
 LF FOOT X 22.33 -102.44 3793.00 3843.00 20  
 RT FOOT X 35.25 -62.56 3791.00 3842.00 23  
 CT FOOT X 29.93 -188.04 3793.00 3852.00 26  
 TOTAL FOOT X 77.11 -346.81 3793.00 3852.00  
 LF FOOT Y 117.24 -76.80 3827.00 3782.00 21  
 RT FOOT Y 17.11 -119.55 3867.00 3843.00 24  
 CT FOOT Y 21.64 -42.43 3959.00 3803.00 27  
 TOTAL FOOT Y 62.78 -59.58 3813.00 3912.00  
 LF FOOT Z 154.29 -27.55 3827.00 3805.00 22  
 RT FOOT Z 193.17 -12.46 3851.00 3960.00 25  
 CT FOOT Z 143.05 -68.44 3819.00 3803.00  
 TOTAL FOOT Z 391.60 -45.02 3835.00 3805.00  
 RES FOOT FORCE 508.06 35.70 3851.00 3935.00

BRACING STUDY TEST: 459 SUBJ: M13 WT: 171.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.02	9.99	3866.00	125.00	48
CARRIAGE X	1.81	-1.40	3839.00	3853.00	36
CARRIAGE Y	1.12	-1.07	3832.00	3853.00	31
CARRIAGE Z	12.16	-0.38	3871.00	3836.00	1
CARRIAGE Z (SM)	10.46	-0.19	3872.00	3765.00	
CARRIAGE VEL	-1.38	-26.14	4166.00	3833.00	29
SEAT X	2.13	-2.02	3841.00	3851.00	32
SEAT Y	1.49	-2.09	3838.00	3844.00	39
SEAT Z	11.07	-0.15	3876.00	3889.00	34
SEAT Z (SM)	10.47	-0.12	3860.00	3690.00	
CHEST X	3.49	-2.04	3890.00	3938.00	5
CHEST Y	-0.31	-2.80	3877.00	3888.00	7
CHEST Z	16.55	-0.90	3897.00	3775.00	
CHEST RES	16.59	0.92	3897.00	3628.00	
CHEST SI	29.09		3791.00	4109.00	
HEAD X	1.60	-2.31	3891.00	3945.00	
HEAD Y	2.28	-1.29	3972.00	3908.00	
HEAD Z	12.76	-1.10	3891.00	3657.00	
HEAD RES	12.94	1.73	3891.00	4114.00	
HEAD SI	18.29		3815.00	3977.00	
HEAD HIC	19.73		3852.00	3935.00	
SHD REFL LF	28.31	3.06	3946.00	3881.00	14
SHD REFL LF	47.52	3.25	3936.00	3882.00	16
LF SHOULDER	74.69	6.37	3939.00	3882.00	
SHD REFL RT	35.19	11.63	3955.00	3871.00	
SHD REFL RT	71.16	15.51	3936.00	3878.00	17
RT SHOULDER	62.45	15.86	3948.00	3880.00	
TOTAL SHLD REFL	83.92	6.51	3937.00	3883.00	
TOTAL SHLD REFL	144.84	22.77	3937.00	3881.00	
TOTAL SHO / WT	0.85	0.13	3937.00	3881.00	
LF LAP BELT	38.74	7.02	3979.00	3881.00	
RT LAP BELT	47.93	14.43	3909.00	3878.00	
TOTAL LAP	84.98	21.88	3971.00	3880.00	
TOTAL LAP / WT	0.50	0.13	3971.00	3880.00	
CROTCH STRAP	119.85	27.57	4052.00	3891.00	
LF SEAT LNK X	37.69	-193.91	4151.00	3891.00	10
RT SEAT LNK X	5.40	-108.35	4174.00	3885.00	19
TOTAL SEAT X	40.78	-297.66	4176.00	3885.00	
SEAT LNK Y	49.21	-75.36	4067.00	3886.00	
LF SEAT PAN Z	415.40	30.49	3889.00	3613.00	11
RT SEAT PAN Z	349.24	28.53	3893.00	3600.00	12
CT SEAT PAN Z	954.79	51.75	3893.00	3601.00	13
TOTAL SEAT Z	1716.38	115.25	3892.00	3600.00	
TOTAL SEAT Z / WT	10.04	0.67	3892.00	3600.00	
RES SEAT FORCE	1743.29	116.54	3892.00	3600.00	
RES SEAT FORCE / WT	10.19	0.68	3892.00	3600.00	
LF FOOT X	31.35	-103.36	3839.00	3898.00	
RT FOOT X	52.91	-62.53	3640.00	3898.00	
CT FOOT X	58.19	-202.30	3840.00	3899.00	
TOTAL FOOT X	137.74	-367.29	3840.00	3898.00	
LF FOOT Y	116.31	-3.35	3889.00	3850.00	
RT FOOT Y	23.09	-114.46	3930.00	3872.00	
CT FOOT Y	7.71	-50.14	3861.00	3849.00	
TOTAL FOOT Y	66.07	-53.47	3877.00	3850.00	
LF FOOT Z	171.96	-80.52	3838.00	3851.00	
RT FOOT Z	189.49	-25.41	3908.00	3849.00	
CT FOOT Z	180.18	-137.10	3839.00	3832.00	
TOTAL FOOT Z	422.47	-191.88	3901.00	3832.00	
RES FOOT FORCE	548.31	56.13	3898.00	3894.00	

BRACING STUDY TEST: 492 SUBJ: P-3 WT: 202.0 G: 10 GP: 2 CELL: G

DATA ID	MAX	MIN	T1	T2	CM
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IOV EXT PWR	10.05	9.96	791.00	4011.00	48
CARRIAGE X	1.81	-1.69	3852.00	3845.00	36
CARRIAGE Y	0.64	-0.55	3872.00	3943.00	31
CARRIAGE Z	13.09	-0.22	3845.00	3750.00	31
CARRIAGE Z (SM)	10.71	-0.05	3846.00	3795.00	29
CARRIAGE VEL	-0.98	-25.72	4180.00	3795.00	29
SEAT X	1.30	-1.82	3853.00	3845.00	32
SEAT Y	0.80	-1.01	3823.00	3917.00	33
SEAT Z	11.72	-0.19	3851.00	3601.00	34
SEAT Z (SM)	10.80	-0.09	3853.00	3600.00	34
CHEST X	2.50	-2.81	3856.00	3904.00	5
CHEST Y	0.37	-2.67	3931.00	3871.00	6
CHEST Z	20.91	-0.82	3874.00	3701.00	7
CHEST RES	21.07	0.51	3874.00	3843.00	
CHEST SI	96.78		3807.00	3937.00	
HEAD X	.92	-2.98	3866.00	3900.00	2
HEAD Y	1.55	-0.40	3980.00	3952.00	3
HEAD Z	12.30	-1.05	3863.00	3690.00	4
HEAD RES	12.33	0.52	3863.00	4120.00	
HEAD SI	19.61		3817.00	3931.00	
HEAD HIC	17.00		3839.00	3906.00	
SHO REFL LF	43.26	4.51	3920.00	3850.00	14
SHO REEL LF	50.15	4.74	3903.00	3959.00	16
LF SHOULDER	79.54	14.20	3910.00	3862.00	
SHD REFL RT	60.45	14.99	3923.00	3856.00	15
SHD REEL RT	57.70	7.84	3903.00	3867.00	17
RT SHOULDER	107.33	25.17	3905.00	3858.00	
TOTAL SHLD REFL	103.17	22.64	3920.00	3857.00	
TOTAL SHLD REEL	107.85	15.07	3903.00	3867.00	
TOTAL SHOULDER	184.03	42.34	3905.00	3859.00	
TOTAL SHO / WT	0.91	0.21	3905.00	3859.00	
LF LAP BELT	79.43	27.24	3937.00	3872.00	8
RT LAP BELT	89.82	36.00	3931.00	3875.00	9
TOTAL LAP	167.99	64.03	3937.00	3873.00	
TOTAL LAP / WT	0.83	0.32	3937.00	3873.00	
CROTCH STRAP	173.09	-1.64	4059.00	3862.00	10
LF SEAT LNK Y	53.84	-214.63	4177.00	3860.00	18
RT SEAT LNK X	28.40	-98.88	3914.00	3859.00	19
TOTAL SEAT X	57.53	-313.52	4196.00	3860.00	
SEAT LNK Y	73.38	-108.92	4056.00	3859.00	35
LF SEAT PAN Z	563.10	53.95	3861.00	3612.00	
RT SEAT PAN Z	531.73	63.12	3867.00	3627.00	12
CT SEAT PAN Z	1093.88	118.85	3870.00	3609.00	13
TOTAL SEAT Z	2158.39	249.77	3869.00	3603.00	
TOTAL SEAT Z / WT	10.69	1.24	3869.00	3603.00	
RES SEAT FORCE	2180.35	251.79	3869.00	3603.00	
RES SEAT FORCE / WT	10.79	1.25	3869.00	3603.00	
LF FOOT X	13.83	-148.20	3810.00	3862.00	20
RT FOOT X	21.80	-91.87	3809.00	3873.00	23
CT FOOT X	12.29	-245.30	3811.00	3865.00	26
TOTAL FOOT X	39.95	-475.41	3811.00	3863.00	
LF FOOT Y	129.87	-7.27	3847.00	3953.00	21
RT FOOT Y	17.46	-141.39	3904.00	3868.00	24
CT FOOT Y	29.26	-46.38	3829.00	3865.00	27
TOTAL FOOT Y	57.55	-73.59	3904.00	3866.00	
LF FOOT Z	231.35	9.52	3849.00	3812.00	22
RT FOOT Z	239.80	-9.27	3865.00	3666.00	25
CT FOOT Z	217.22	-62.98	3853.00	3931.00	
TOTAL FOOT Z	543.72	-31.72	3868.00	3802.00	
RES FOOT FORCE	701.91	53.74	3866.00	3813.00	

BRACING STUDY TEST: 468 SUBJ: R-2 WT: 145.0 G: 10 GP: 1 CELL: 6

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.02	9.98	430.00	991.00	46
CARRIAGE X	1.39	-1.07	3857.00	3865.00	36
CARRIAGE Y	0.77	-0.65	3909.00	3872.00	31
CARRIAGE Z	12.15	-0.15	3888.00	3611.00	1
CARRIAGE Z (SM)	10.40	-0.05	3889.00	3700.00	
CARRIAGE VEL	-1.26	-26.19	4153.00	3845.00	29
SEAT X	1.75	-1.54	3859.00	3867.00	92
SEAT Y	0.77	-1.07	3856.00	3861.00	93
SEAT Z	11.61	-0.17	3895.00	3708.00	34
SEAT Z (SM)	10.57	-0.11	3896.00	3771.00	5
CHEST X	4.93	-1.49	3912.00	3947.00	6
CHEST Y	-0.34	-2.58	3955.00	3924.00	7
CHEST Z	15.32	-0.63	3926.00	3802.00	
CHEST RES	15.53	0.76	3926.00	3716.00	
CHEST SI	28.41		3851.00	4105.00	
HEAD X	.37	-4.12	3851.00	3951.00	2
HEAD Y	1.36	-0.28	3967.00	4188.00	34
HEAD Z	12.82	-0.51	3908.00	3732.00	
HEAD RES	12.92	0.23	3909.00	4200.00	
HEAD SI	21.33		3857.00	4098.00	
HEAD HIC	16.28		3883.00	3942.00	
SHD REFL LF	29.23	2.12	3956.00	3891.00	14
SHD REEL LF	30.71	5.22	3943.00	3898.00	16
LF SHOULDER	57.12	8.68	3944.00	3891.00	
SHD REFL RT	29.08	7.19	3979.00	3889.00	15
SHD REEL RT	29.16	5.92	3957.00	3903.00	17
RT SHOULDER	53.78	14.53	3960.00	3890.00	
TOTAL SHLD REFL	57.47	9.64	3990.00	3890.00	
TOTAL SHLD REEL	59.15	12.34	3944.00	3901.00	
TOTAL SHOULDER	108.69	23.26	3944.00	3890.00	
TOTAL SHD / WT	0.75	0.16	3944.00	3890.00	
LAP BELT	39.99	8.08	3985.00	3925.00	8
RT LAP BELT	43.87	6.41	3983.00	3900.00	9
TOTAL LAP	83.00	17.17	3984.00	3899.00	
TOTAL LAP / WT	0.57	0.12	3984.00	3899.00	
CROTCH STRAP	65.80	-8.77	3979.00	3906.00	10
LF SEAT LNK X	54.90	-124.27	4110.00	3903.00	18
RT SEAT LNK X	45.80	-63.04	3960.00	3911.00	19
TOTAL SEAT X	80.11	-179.24	3973.00	3911.00	
SEAT LNK Y	67.50	-2.38	3960.00	3901.00	35
LF SEAT PAN Z	313.79	27.80	3905.00	3640.00	11
RT SEAT PAN Z	416.34	23.05	3912.00	3601.00	12
CT SEAT PAN Z	901.77	83.12	3919.00	3620.00	13
TOTAL SEAT Z	1621.90	40.50	3913.00	3620.00	
TOTAL SEAT Z / WT	11.19	0.97	3913.00	3620.00	
RES SEAT FORCE	1630.49	147.32	3913.00	3620.00	
RES SEAT FORCE / WT	11.24	1.02	3913.00	3620.00	
LF FOOT X	22.51	-139.33	3858.00	3907.00	20
RT FOOT X	45.12	-72.08	3895.00	3906.00	23
CT FOOT X	36.65	-207.52	3858.00	3905.00	26
TOTAL FOOT X	96.35	-417.13	3858.00	3906.00	
LF FOOT Y	123.68	-4.72	3990.00	3847.00	21
RT FOOT Y	20.84	-112.28	3858.00	3906.00	24
CT FOOT Y	8.17	-87.06	3878.00	3909.00	27
TOTAL FOOT Y	67.57	-71.61	3878.00	3906.00	
LF FOOT Z	159.94	-32.34	3914.00	3849.00	22
RT FOOT Z	225.10	-29.92	3914.00	3887.00	25
CT FOOT Z	145.67	-103.16	3912.00	3869.00	
TOTAL FOOT Z	484.84	-126.68	3914.00	3889.00	
RES FOOT FORCE	620.89	13.80	3914.00	3861.00	

BRAKING STUDY TEST: 464 SUBJ: R-3 WT: 147.0 G: 10 GP: 1 CELL: G

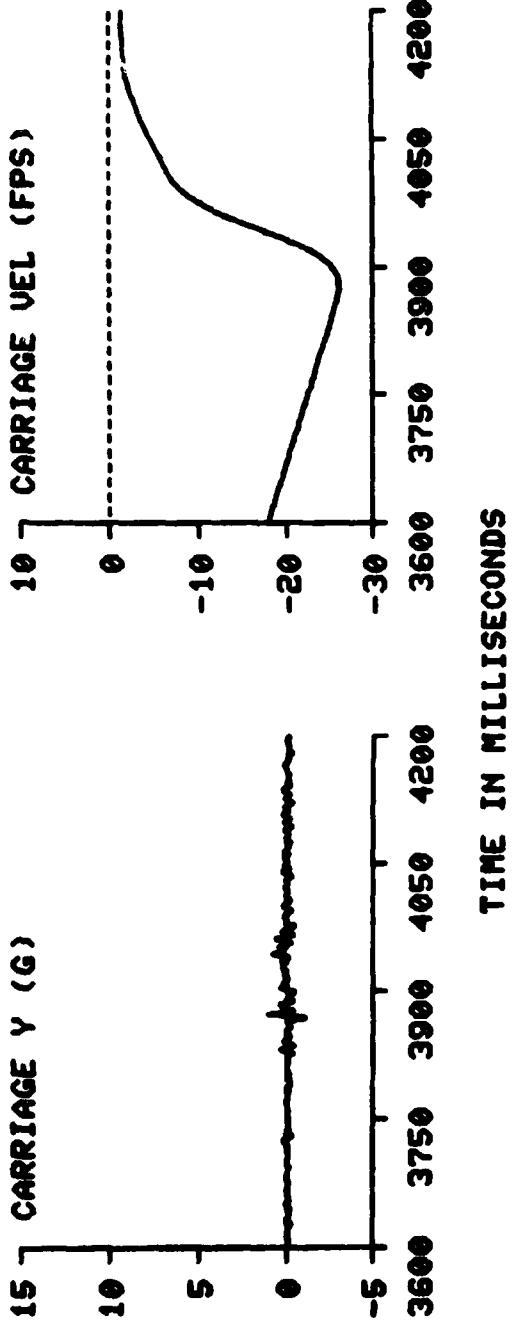
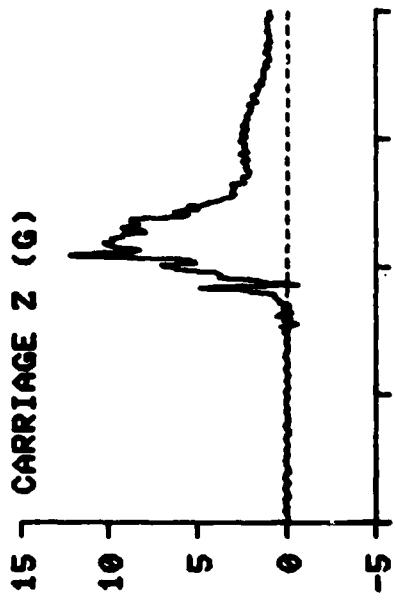
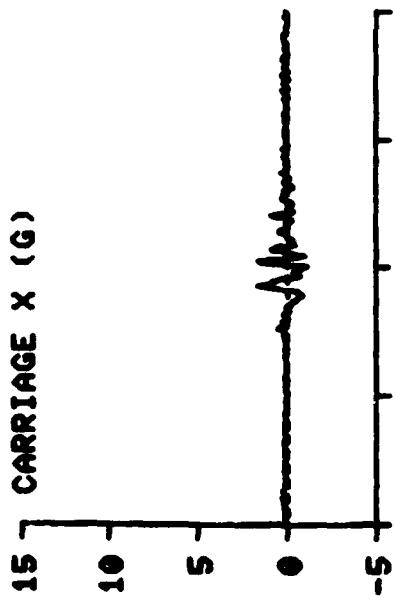
DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.02	9.98	531.00	979.00	48
CARRIAGE X	1.76	-1.24	3879.00	3885.00	36
CARRIAGE Y	1.03	-1.14	3870.00	3884.00	31
CARRIAGE Z	12.70	-0.25	3909.00	3806.00	
CARRIAGE Z (SM)	10.60	-0.11	3910.00	3804.00	
CARRIAGE VEL	-1.30	-26.23	4193.00	3871.00	29
SEAT X	1.58	-1.48	3917.00	3922.00	32
SEAT Y	1.07	-1.38	3877.00	3882.00	33
SEAT Z	11.30	-0.13	3920.00	3723.00	34
SEAT Z (SM)	10.55	-0.10	3918.00	3722.00	
CHEST X	4.13	-1.39	3941.00	3968.00	5
CHEST Y	0.16	-2.20	3924.00	3933.00	6
CHEST Z	21.53	-0.95	3930.00	3695.00	7
CHEST RES	21.72	0.97	3931.00	3866.00	
CHEST SI	35.67		3873.00	3999.00	
HEAD X	0.98	-3.95	3923.00	3965.00	2
HEAD Y	2.75	1.42	4002.00	3956.00	3
HEAD Z	12.20	-1.43	3929.00	3720.00	
HEAD RES	12.43	1.78	3929.00	4149.00	
HEAD SI	17.40		3885.00	4019.00	
HEAD HIC	12.98		3890.00	3993.00	
SHO REFL LF	38.22	6.72	4004.00	3916.00	14
SHO REEL LF	37.07	13.03	3985.00	3934.00	16
LF SHOULDER	71.18	21.00	3971.00	3916.00	
SHO REFL RT	31.50	16.55	3978.00	3928.00	15
SHO REEL RT	42.10	12.72	3978.00	4055.00	17
RT SHOULDER	73.26	30.19	3977.00	3928.00	
TOTAL SHLD REFL	68.57	24.63	4014.00	3928.00	
TOTAL SHLD REEL	78.49	26.62	3966.00	3931.00	
TOTAL SHOULDER	142.36	52.24	3971.00	3927.00	
TOTAL SHO / WT	0.97	0.36	3971.00	3927.00	
LF LAP BELT	47.84	13.12	3998.00	3929.00	8
RT LAP BELT	59.82	16.03	4002.00	3945.00	9
TOTAL LAP	107.31	31.82	3999.00	3937.00	
TOTAL LAP / WT	0.73	0.22	3999.00	3937.00	
CROTCH STRAP	89.21	-25.31	4011.00	3929.00	10
LF SEAT LNK X	34.91	-133.89	4151.00	3923.00	18
RT SEAT LNK X	6.79	-96.51	4180.00	3931.00	19
TOTAL SEAT X	39.24	-227.94	4151.00	3923.00	
SEAT LNK Y	48.37	-39.74	4016.00	3927.00	35
LF SEAT PAN Z	385.54	35.94	3934.00	3811.00	11
RT SEAT PAN Z	507.87	63.75	3934.00	3602.00	12
CT SEAT PAN Z	765.46	72.23	3933.00	3808.00	13
TOTAL SEAT Z	1657.26	178.71	3933.00	3608.00	
TOTAL SEAT Z / WT	11.27	1.22	3933.00	3608.00	
RES SEAT FORCE	1672.95	179.21	3933.00	3602.00	
RES SEAT FORCE / WT	11.38	1.22	3933.00	3602.00	
LF FOOT X	17.76	-95.26	3880.00	3938.00	20
RT FOOT X	35.79	-48.80	3877.00	3936.00	23
CT FOOT X	19.18	-161.50	3879.00	3922.00	26
TOTAL FOOT X	63.03	-305.55	3880.00	3936.00	
LF FOOT Y	115.18	-13.22	3910.00	3888.00	21
RT FOOT Y	26.25	-96.21	3879.00	3927.00	24
CT FOOT Y	21.91	-46.62	4047.00	3927.00	27
TOTAL FOOT Y	52.74	-74.49	3878.00	3886.00	
LF FOOT Z	158.38	-61.70	3877.00	3871.00	22
RT FOOT Z	143.25	-16.75	3925.00	3870.00	
CT FOOT Z	164.82	-117.12	3877.00	3890.00	25
TOTAL FOOT Z	398.35	-163.99	3877.00	3871.00	
RES FOOT FORCE	404.62	15.10	3877.00	3694.00	

BRACING STUDY TEST: 527 SUBJ: S-3 WT: 170.0 G: 10 GP: 1 CELL: G

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.05	9.96	785.00	852.00	48
CARRIAGE X	1.51	-1.28	3864.00	3871.00	36
CARRIAGE Y	1.05	-0.81	3855.00	3879.00	31
CARRIAGE Z	11.84	-0.37	3901.00	3787.00	1
CARRIAGE Z (SM)	10.99	-0.11	3900.00	3790.00	
CARRIAGE VEL	-1.05	-26.13	4150.00	3849.00	29
SEAT X	1.84	-1.67	3866.00	3871.00	32
SEAT Y	1.05	-1.00	3872.00	3867.00	33
SEAT Z	12.81	-0.21	3906.00	3705.00	34
SEAT Z (SM)	11.46	-0.10	3906.00	3705.00	
CHEST X	3.77	-1.52	3916.00	3976.00	5
CHEST Y	-0.25	-2.52	3967.00	3925.00	6
CHEST Z	16.44	-0.77	3922.00	3755.00	7
CHEST RES	16.87	0.87	3922.00	3739.00	
CHEST SI	30.76		3857.00	3963.00	
HEAD X	2.09	-2.88	3919.00	3961.00	2
HEAD Y	1.23	-0.67	3995.00	3941.00	3
HEAD Z	19.46	-1.06	3920.00	3890.00	4
HEAD RES	13.63	0.67	3920.00	4194.00	
HEAD SI	20.07		3865.00	3987.00	
HEAD HIC	16.48		3886.00	3948.00	
SHO REFL LF	27.39	5.04	3980.00	3916.00	14
SHO REEL LF	31.06	4.05	3975.00	3916.00	16
LF SHOULDER	55.94	9.09	3979.00	3916.00	
SHO REFL RT	31.17	7.21	3993.00	3909.00	15
SHO REEL RT	45.85	2.09	3967.00	3913.00	17
RT SHOULDER	72.22	10.33	3968.00	3910.00	
TOTAL SHLD REFL	57.13	13.96	3960.00	3908.00	
TOTAL SHLD REEL	72.82	6.96	3969.00	3915.00	
TOTAL SHOULDER	123.68	23.44	3970.00	3913.00	
TOTAL SHO / WT	0.73	0.14	3970.00	3913.00	
LF LAP BELT	38.57	16.84	3987.00	3900.00	8
RT LAP BELT	30.92	6.34	3984.00	3307.00	9
TOTAL LAP	68.63	26.63	3985.00	3906.00	
TOTAL LAP / WT	0.40	0.16	3985.00	3908.00	
CROTCH STRAP	109.23	-18.90	3982.00	3914.00	
LF SEAT LNK X	47.22	-232.78	3758.00	3916.00	18
RT SEAT LNK X	35.27	-68.65	3958.00	3921.00	19
TOTAL SEAT X	36.65	-297.89	3688.00	3914.00	
SEAT LNK Y	48.80	-112.13	4160.00	3925.00	35
LF SEAT PAN Z	580.92	58.39	3915.00	3601.00	11
RT SEAT PAN Z	479.82	34.66	3916.00	3607.00	12
CT SEAT PAN Z	688.45	72.96	3918.00	3605.00	13
TOTAL SEAT Z	1897.34	174.59	3917.00	3605.00	
TOTAL SEAT Z / WT	11.16	1.03	3917.00	3605.00	
RES SEAT FORCE	1823.01	177.27	3917.00	3605.00	
RES SEAT FORCE / WT	11.31	1.04	3917.00	3605.00	
LF FOOT X	22.71	-139.13	3890.00	3921.00	20
RT FOOT X	49.86	-49.72	3861.00	3896.00	23
CT FOOT X	27.12	-193.80	3866.00	3920.00	26
TOTAL FOOT X	68.92	-355.24	3861.00	3920.00	
LF FOOT Y	86.81	-19.08	3910.00	3674.00	21
RT FOOT Y	16.91	-103.78	3865.00	3926.00	24
CT FOOT Y	84.72	-54.54	3937.00	3905.00	27
TOTAL FOOT Y	78.45	-55.54	3938.00	3900.00	
LF FOOT Z	172.84	-81.70	3930.00	3899.00	22
RT FOOT Z	174.15	-57.25	3910.00	3876.00	25
CT FOOT Z	330.85	-90.83	3910.00	3875.00	28
TOTAL FOOT Z	567.24	-226.10	3910.00	3876.00	
RES FOOT FORCE	565.10	15.92	3910.00	4009.00	

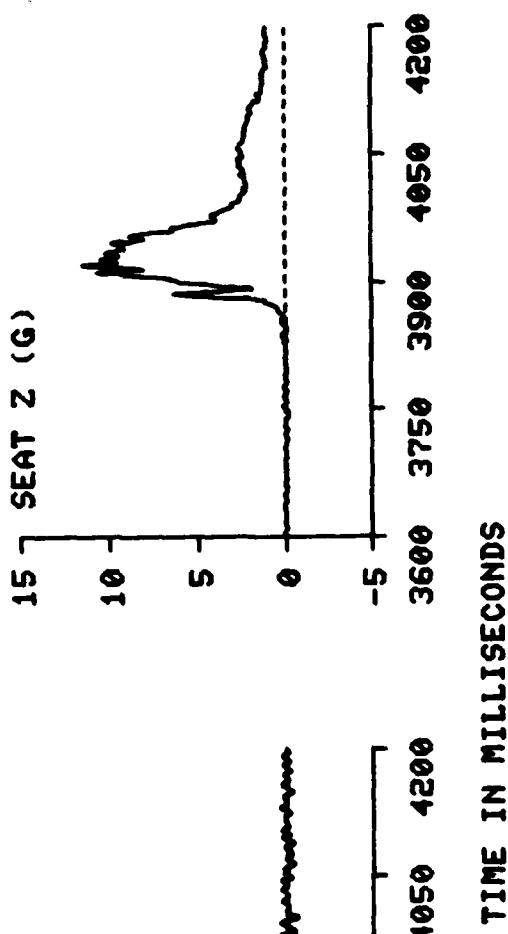
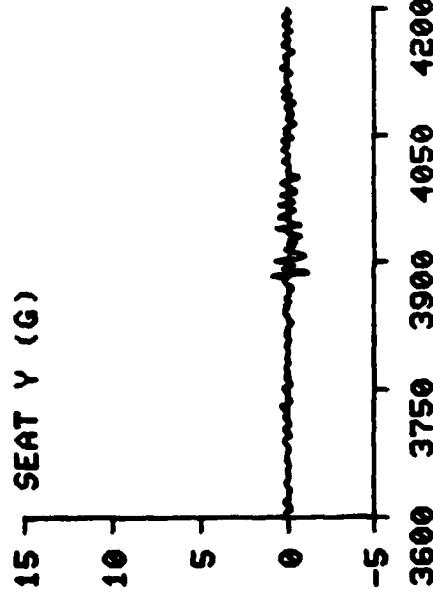
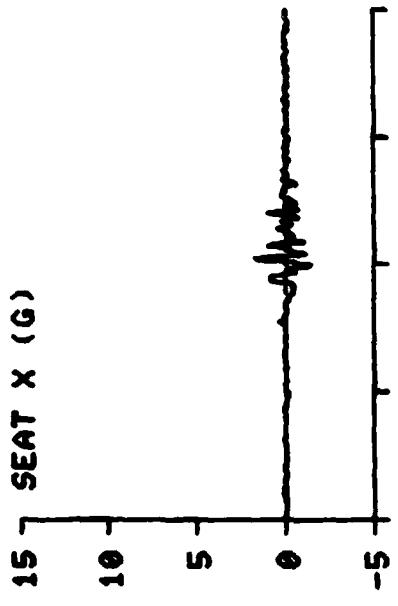
BRACING POSITIONS STUDY

TEST: 467      SUBJ: F-2



BRACING POSITIONS STUDY

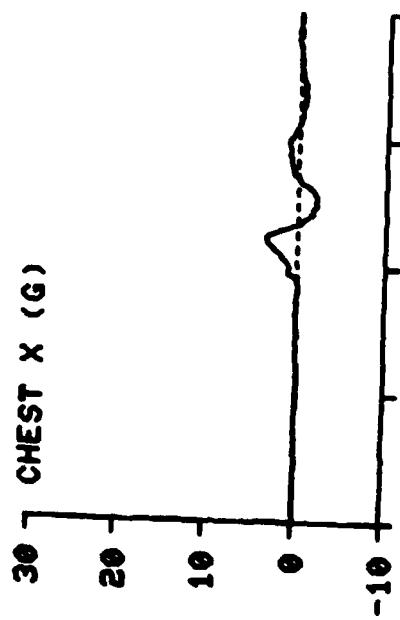
TEST: 467 SUBJ: F-2



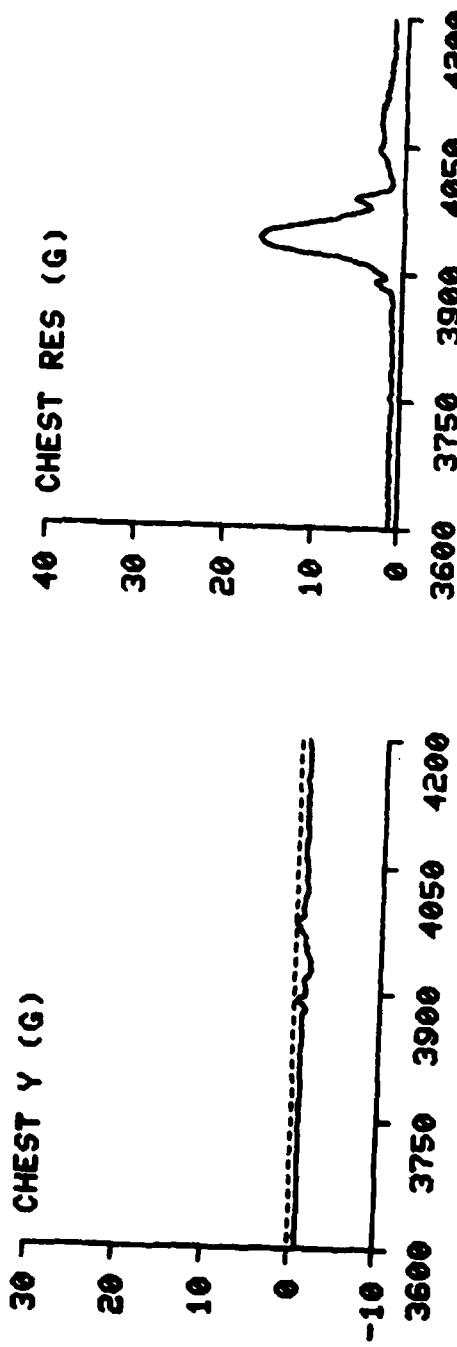
TIME IN MILLISECONDS

BRACING POSITIONS STUDY

TEST: 467      SUBJ: F-2

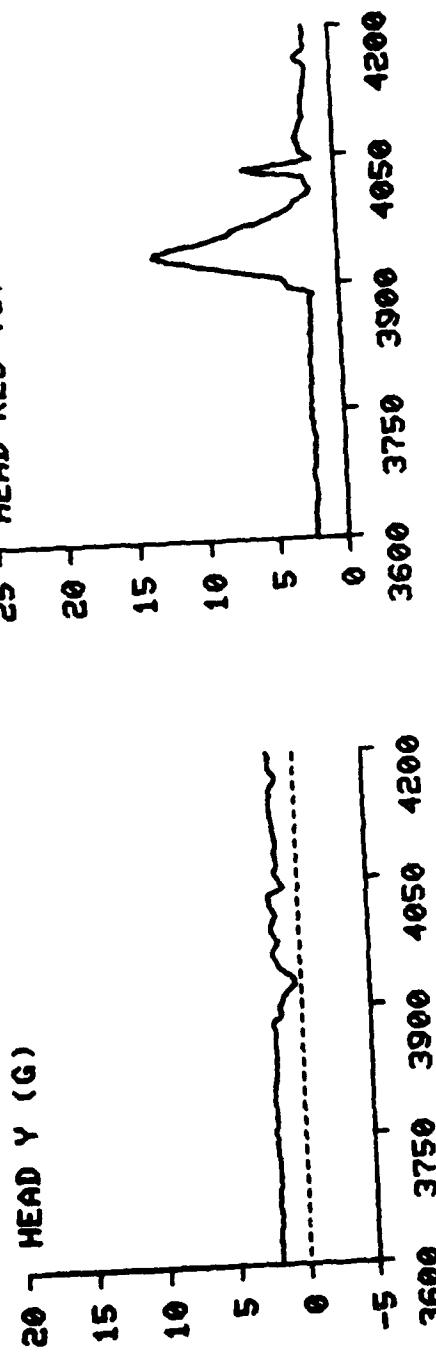


CHEST Y (G)



TIME IN MILLISECONDS

TIME IN MILLISECONDS



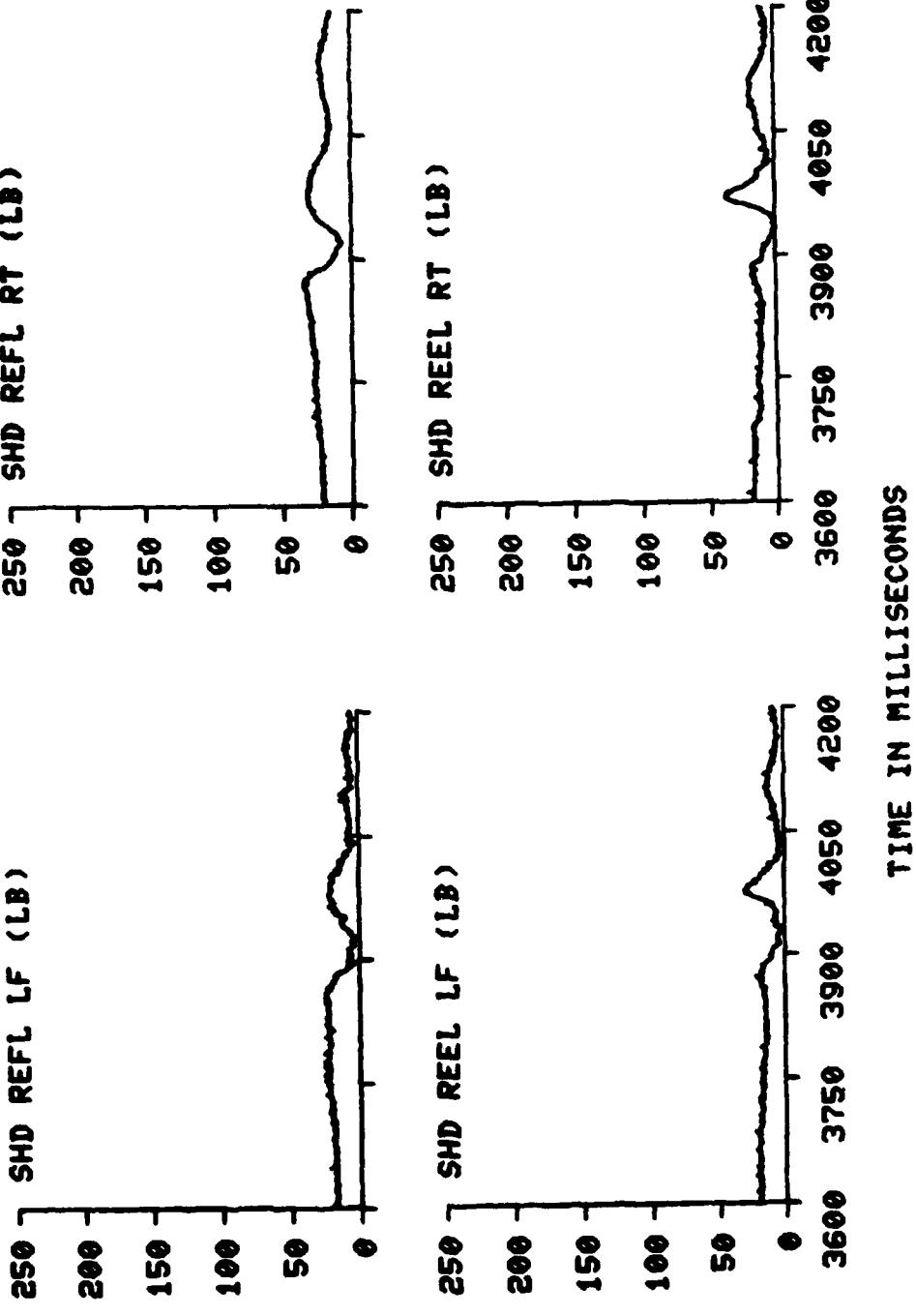
104

TEST: 467 SUBJ: F-2

BRACING POSITIONS STUDY

BRACING POSITIONS STUDY

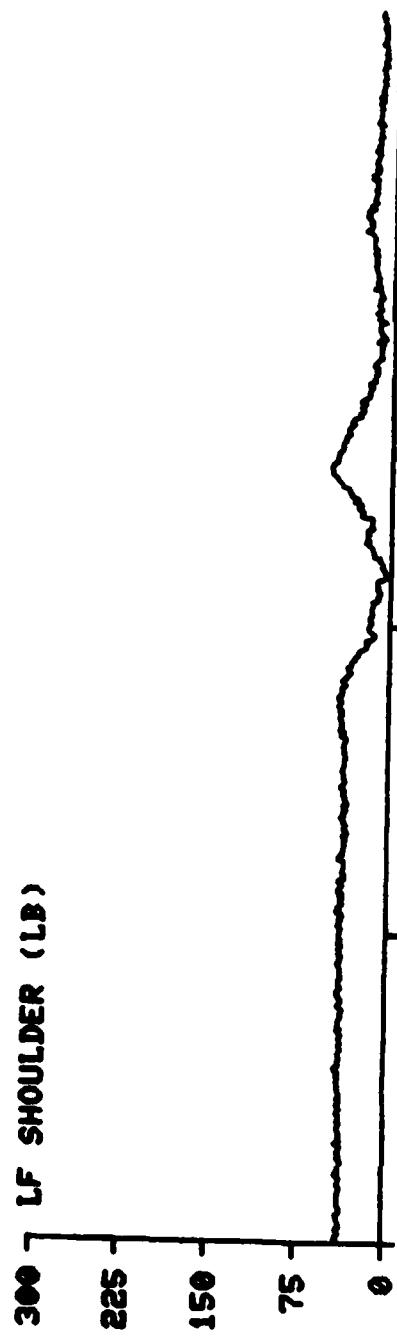
TEST: 467 SUBJ: F-2



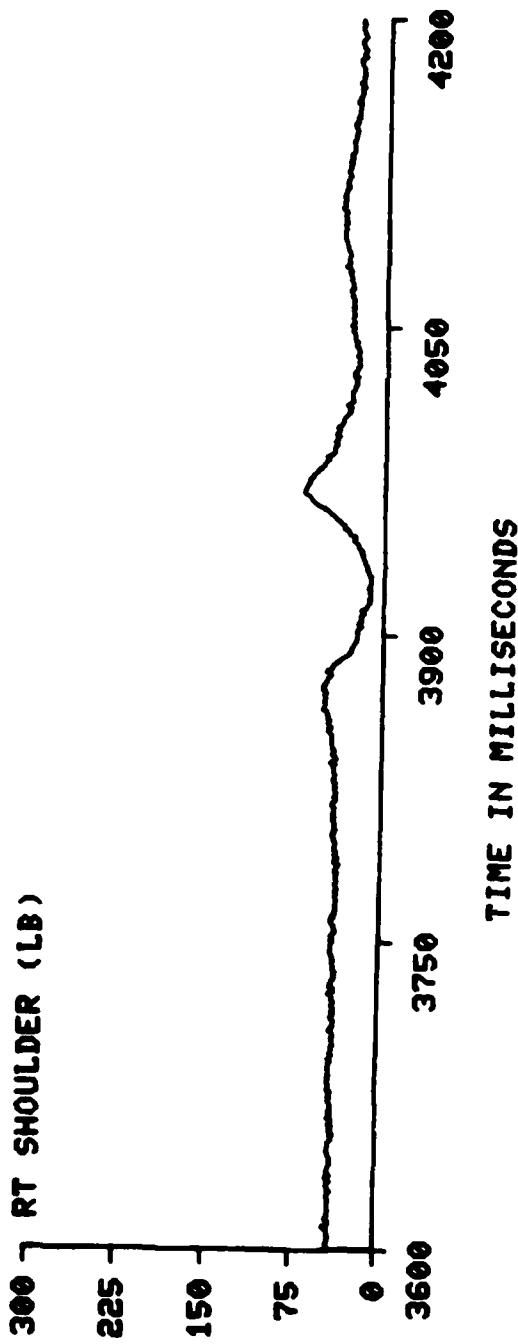
BRACING POSITIONS STUDY

TEST: 467 SUBJ: F-2

LF SHOULDER (LB)



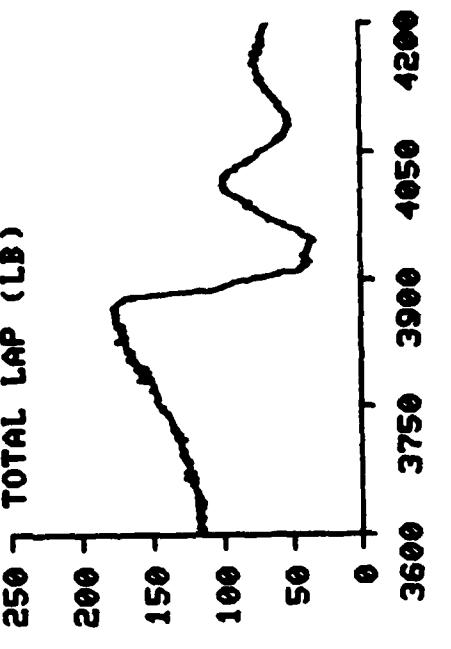
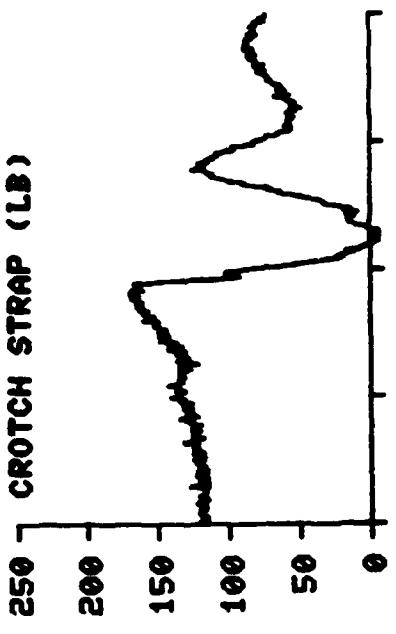
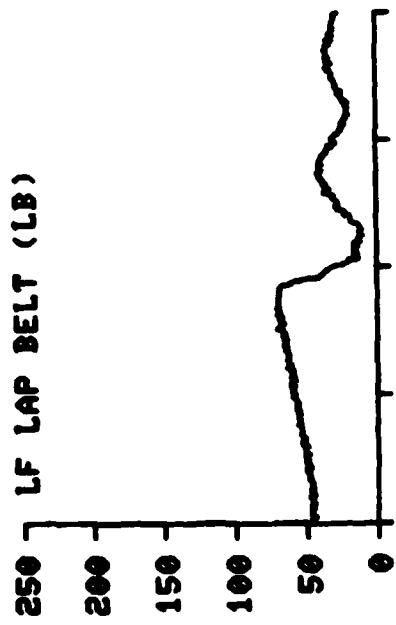
RT SHOULDER (LB)



TIME IN MILLISECONDS

BRACING POSITIONS STUDY

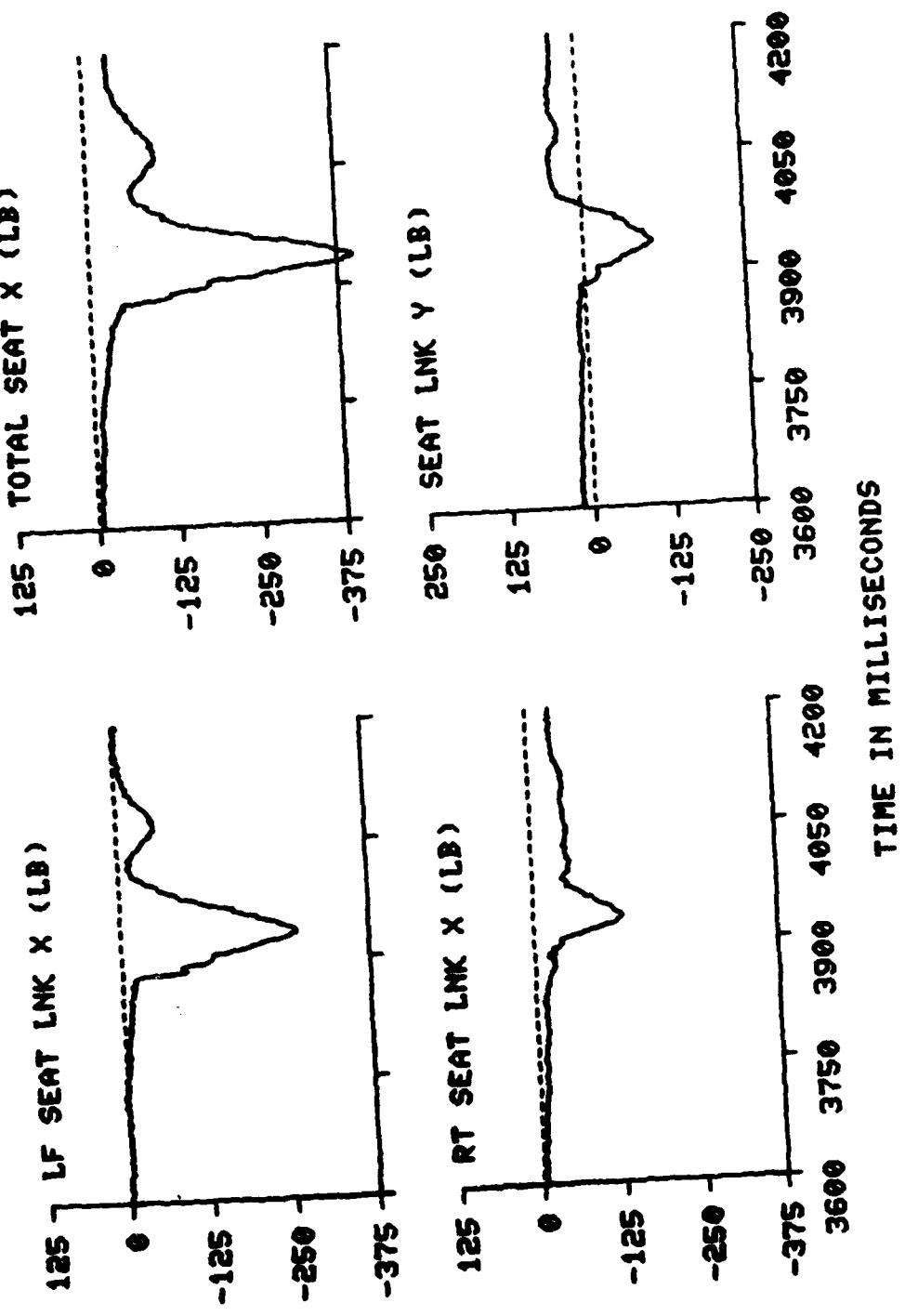
TEST: 467 SUBJ: F-2



TIME IN MILLISECONDS

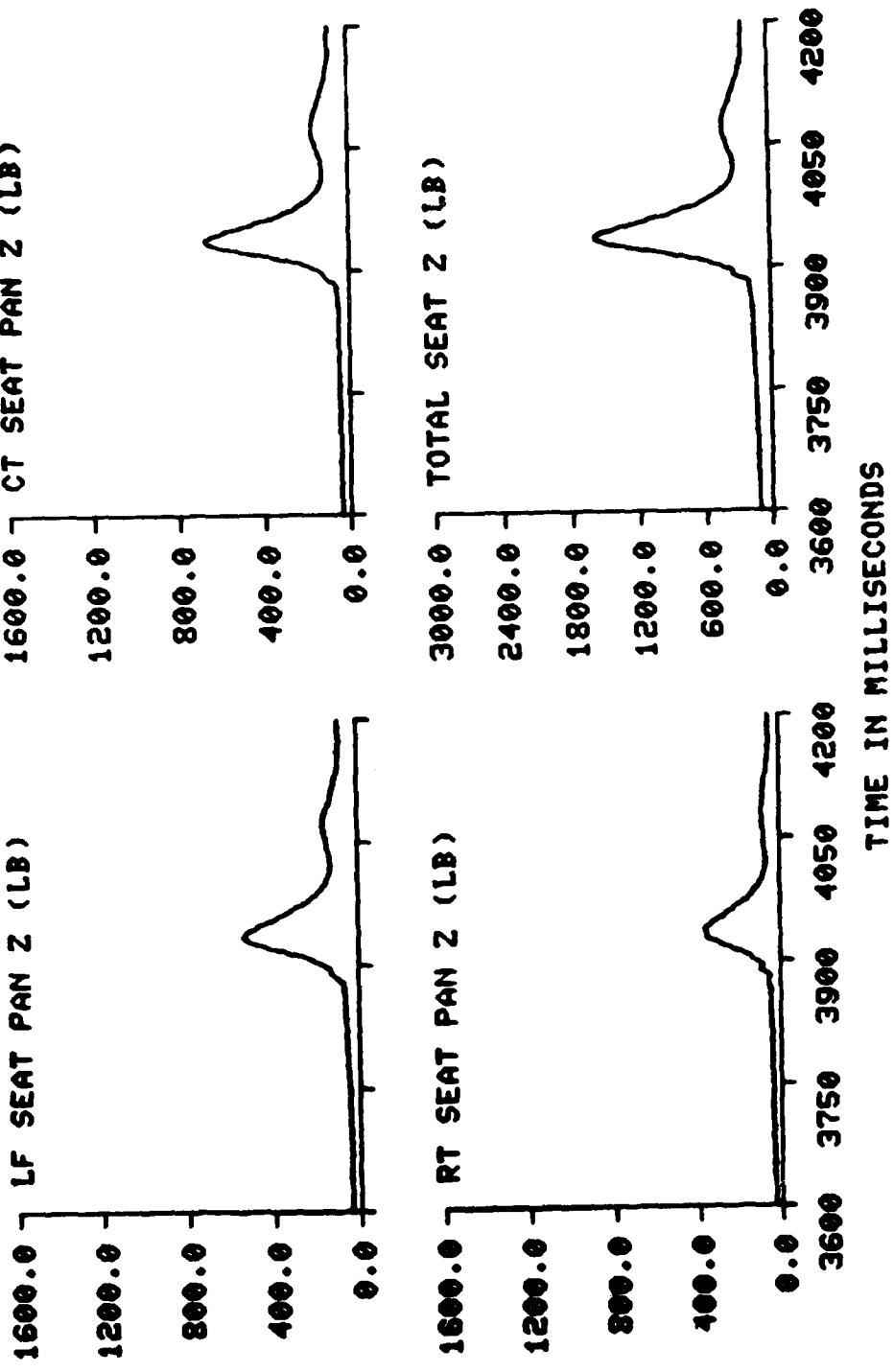
BRACING POSITIONS STUDY

TEST: 467 SUBJ: F-2



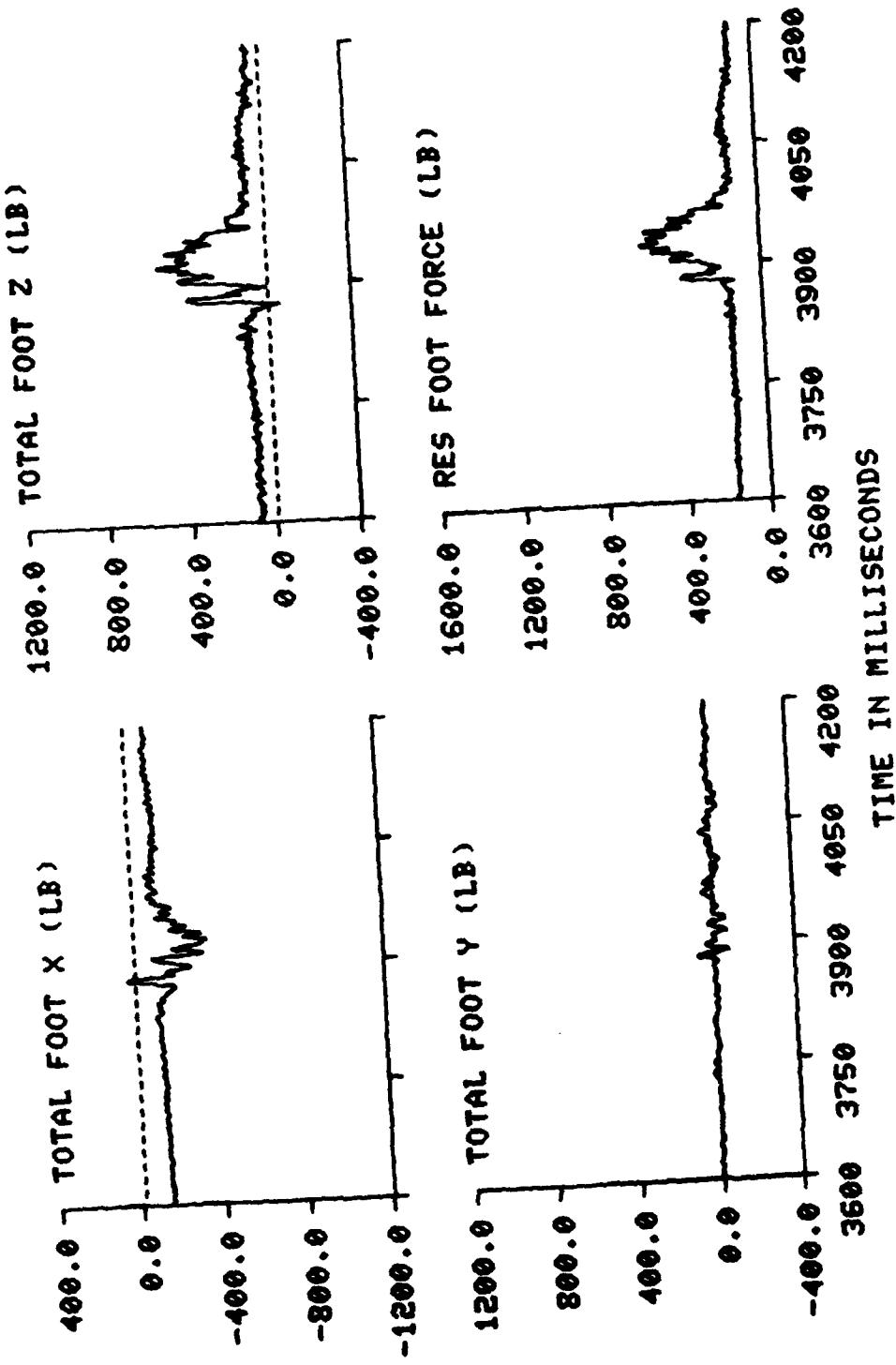
BRACING POSITIONS STUDY

TEST: 467 SUBJ: F-2



BRACING POSITIONS STUDY

TEST: 467 SUBJ: F-2



BRACING POSITIONS TEST: 539 SUBJ: F-3 WT: 160.0 G: 10 GP: 1 CELL: K

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.02	9.98	352.00	286.00	48
CARRIAGE X	1.01	-1.08	3935.00	3923.00	36
CARRIAGE Y	0.72	-0.93	3937.00	3875.00	31
CARRIAGE Z	11.09	-0.13	3924.00	3706.00	1
CARRIAGE Z (SM)	10.56	-0.04	3925.00	3704.00	
CARRIAGE VEL	-1.31	-26.17	4197.00	3878.00	29
SEAT Z #2	13.00	-0.13	3932.00	3637.00	38
FOOT PLATE Z	13.05	-0.99	3932.00	3739.00	39
SEAT X	1.50	-1.30	3885.00	3924.00	32
SEAT Y	0.78	-1.14	3884.00	3890.00	33
SEAT Z	12.69	-0.17	3932.00	3732.00	34
SEAT Z (SM)	11.49	-0.11	3893.00	3959.00	5
CHEST X	1.69	-1.07	3893.00	3948.00	6
CHEST Y	0.22	-3.01	3926.00	3948.00	7
CHEST Z	15.59	-1.07	3954.00	3811.00	
CHEST RES	15.77	1.06	3954.00	3875.00	
CHEST SI	26.20		3887.00	3999.00	
HEAD X	0.48	-5.85	3887.00	4006.00	2
HEAD Y	5.81	-1.07	4001.00	4027.00	3
HEAD Z	10.61	-1.48	3941.00	3644.00	4
HEAD RES	10.63	1.23	3941.00	3890.00	
HEAD SI	14.27		3899.00	4032.00	
HEAD MIC	11.99		3912.00	4022.00	
SHD REFL LF	76.34	1.57	4019.00	3924.00	14
SHD REEL LF	123.69	21.56	3961.00	4076.00	16
LF SHOULDER	158.29	52.53	3962.00	3924.00	
SHD REFL RT	82.01	11.65	4026.00	3924.00	15
SHD REEL RT	130.31	21.22	3961.00	4100.00	17
RT SHOULDER	178.42	65.71	3961.00	4068.00	
TOTAL SHLD REFL	157.97	13.21	4019.00	3924.00	
TOTAL SHLD REEL	254.00	44.31	3961.00	4087.00	
TOTAL SHOULDER	336.36	116.68	3961.00	3924.00	
TOTAL SHD / WT	2.10	0.74	3961.00	3924.00	
LF LAP BELT	45.45	12.75	4026.00	3938.00	8
RT LAP BELT	59.13	17.20	4031.00	3932.00	9
TOTAL LAP	103.61	30.93	4029.00	3937.00	
TOTAL LAP / WT	0.65	0.19	4029.00	3937.00	
CROTCH STRAP	72.51	-15.81	4030.00	3944.00	10
LF SEAT LNK X	36.86	-227.58	3851.00	3941.00	18
RT SEAT LNK X	53.85	-17.07	3990.00	3941.00	19
TOTAL SEAT X	48.94	-245.06	3866.00	3941.00	
SEAT LNK Y	49.16	-71.16	4156.00	3940.00	35
LF SEAT PAN Z	414.86	43.98	3942.00	3617.00	11
RT SEAT PAN Z	318.26	29.29	3942.00	3601.00	12
CT SEAT PAN Z	849.60	78.10	3941.00	3605.00	13
TOTAL SEAT Z	1582.19	159.53	3942.00	3601.00	
TOTAL SEAT Z / WT	9.89	1.00	3942.00	3601.00	
RES SEAT FORCE	1602.35	167.81	3942.00	3601.00	
RES SEAT FORCE / WT	10.01	1.05	3942.00	3601.00	
LF FOOT X	-48.14	-166.58	3888.00	3947.00	20
RT FOOT X	12.88	-72.59	3886.00	3947.00	23
CT FOOT X	-87.22	-230.33	4181.00	3941.00	26
TOTAL FOOT X	-133.11	-458.76	3887.00	3947.00	
LF FOOT Y	134.22	-7.28	3930.00	4131.00	21
RT FOOT Y	21.14	-118.19	4179.00	3931.00	24
CT FOOT Y	6.88	-50.74	4043.00	3937.00	27
TOTAL FOOT Y	32.00	-35.12	4044.00	4014.00	
LF FOOT Z	158.90	32.16	3938.00	3982.00	22
RT FOOT Z	181.40	36.83	3941.00	4194.00	25
CT FOOT Z	107.20	-87.51	3934.00	3620.00	28
TOTAL FOOT Z	375.83	48.62	3937.00	4165.00	
RES FOOT FORCE	574.80	164.91	3939.00	4179.00	

BRACING POSITIONS TEST: 553 SUBJ: F-2 WT: 155.0 G: 10 GP: 1 CELL: K

DATA ID	MX	MIN	T1	T2	CM
IOV EXT PWR	10.03	9.97	253.00	775.00	48
CARRIAGE X	1.22	-1.05	3873.00	3884.00	36
CARRIAGE Y	0.87	-0.93	3892.00	3848.00	31
CARRIAGE Z	11.78	-0.23	3865.00	3791.00	1
CARRIAGE Z (SM)	10.65	-0.05	3866.00	3693.00	
CARRIAGE VEL	-1.09	-26.24	4135.00	3831.00	29
SEAT Z #2	11.62	-0.20	3873.00	3755.00	38
FOOT PLATE Z	11.86	-0.95	3878.00	3885.00	39
SEAT X	1.91	-0.97	3872.00	3864.00	32
SEAT Y	0.67	-1.25	3862.00	3836.00	33
SEAT Z	11.59	-0.19	3873.00	3755.00	34
SEAT Z (SM)	11.00	-0.10	3873.00	3683.00	
CHEST X	9.30	-0.74	3880.00	3863.00	5
CHEST Y	1.11	-3.61	3863.00	3889.00	6
CHEST Z	18.22	-0.94	3888.00	3756.00	7
CHEST RES	18.64	0.68	3888.00	3951.00	
CHEST SI	33.80		3831.00	3947.00	
HEAD X	.60	-4.09	3826.00	3939.00	
HEAD Y	3.15	-4.52	3949.00	3932.00	
HEAD Z	12.58	-1.32	3883.00	3689.00	
HEAD RES	12.76	0.70	3883.00	4178.00	
HEAD SI	17.70		3839.00	3979.00	
HEAD MIC	14.01		3853.00	3959.00	
SHD REFL LF	54.72	-0.80	3855.00	3876.00	14
SHD REEL LF	60.99	0.81	3804.00	4033.00	16
LF SHOULDER	105.31	22.25	3906.00	4023.00	
SHD REFL RT	47.88	6.44	3970.00	3867.00	15
SHD REEL RT	106.90	13.67	3907.00	4041.00	17
RT SHOULDER	151.60	33.40	3907.00	3866.00	
TOTAL SHD REFL	98.67	6.62	3869.00	3867.00	
TOTAL SHD REEL	186.71	15.01	3905.00	4042.00	
TOTAL SHOULDER	256.81	57.16	3907.00	3865.00	
TOTAL SHD / WT	1.66	0.37	3907.00	3865.00	
LF LAP BELT	42.10	26.28	3861.00	3865.00	8
RT LAP BELT	47.91	26.91	3856.00	3870.00	9
TOTAL LAP	87.75	54.68	3856.00	3865.00	
TOTAL LAP / WT	0.57	0.35	3856.00	3865.00	
CROTCH STRAP	94.19	13.04	4098.00	3878.00	10
LF SEAT LNK X	23.28	-287.08	3737.00	3887.00	18
RT SEAT LNK X	-3.11	-121.78	3602.00	3882.00	19
TOTAL SEAT X	5.16	-387.71	3605.00	3882.00	
SEAT LNK Y	31.50	-121.02	3600.00	3883.00	95
LF SEAT PAN Z	479.95	39.52	3864.00	3828.00	11
RT SEAT PAN Z	400.94	23.17	3887.00	3629.00	12
CT SEAT PAN Z	762.51	56.99	3884.00	3638.00	13
TOTAL SEAT Z	1626.02	131.19	3887.00	3612.00	
TOTAL SEAT Z / WT	10.49	0.85	3887.00	3612.00	
RES SEAT FORCE	1875.25	134.41	3887.00	3612.00	
RES SEAT FORCE / WT	10.81	0.87	3887.00	3612.00	
LF FOOT X	14.03	-57.99	3873.00	3880.00	20
RT FOOT X	8.44	-94.66	3954.00	3883.00	23
CT FOOT X	-16.82	-157.45	3830.00	3882.00	26
TOTAL FOOT X	-12.46	-297.06	3829.00	3881.00	
LF FOOT Y	80.60	-16.35	3868.00	3936.00	21
RT FOOT Y	15.35	-119.92	3820.00	3877.00	24
CT FOOT Y	47.31	-7.67	3845.00	3841.00	27
TOTAL FOOT Y	66.14	-61.24	3830.00	3837.00	
LF FOOT Z	135.45	-15.19	3880.00	3837.00	22
RT FOOT Z	143.46	-11.72	3879.00	3830.00	25
CT FOOT Z	180.63	-50.89	3874.00	3822.00	
TOTAL FOOT Z	396.41	20.24	3879.00	4169.00	28
RES FOOT FORCE	488.05	70.61	3879.00	4093.00	

BRACING POSITIONS TEST: 543 SUBJ: F-4	WT: 150.0	G: 10	GP:	CELL: K	
DATA ID	MAX	MIN	T1	T2	CM
10V EXT PWR	10.09	9.98	193.00	302.00	48
CARRIAGE X	0.96	-0.74	3877.00	3911.00	36
CARRIAGE Y	0.85	-0.43	3955.00	3892.00	31
CARRIAGE Z	10.86	-0.21	3916.00	3724.00	1
CARRIAGE Z (SM)	10.27	-0.07	3916.00	3723.00	29
CARRIAGE VEL	-1.15	-25.33	4183.00	3875.00	38
SEAT Z #2	12.62	-0.12	3923.00	3748.00	39
FOOT PLATE Z	12.09	-0.58	3924.00	3728.00	32
SEAT X	1.05	-1.01	3919.00	3915.00	33
SEAT Y	1.13	-1.31	3877.00	3883.00	34
SEAT Z	12.61	-0.15	3922.00	3731.00	
SEAT Z (SM)	11.40	-0.09	3922.00	3728.00	5
CHEST X	3.91	-1.85	3956.00	3992.00	6
CHEST Y	0.35	-2.39	3956.00	3979.00	7
CHEST Z	15.07	-1.03	3946.00	3995.00	
CHEST RES	15.32	0.71	3946.00	4192.00	
CHEST SI	31.09		3875.00	4008.00	
HEAD X	0.58	-4.50	3708.00	3983.00	2
HEAD Y	7.02	-0.79	3984.00	3997.00	3
HEAD Z	13.25	-1.28	3939.00	3616.00	4
HEAD RES	19.27	0.98	3939.00	4099.00	
HEAD SI	18.05		3887.00	4021.00	
HEAD HIC	18.57		3902.00	4006.00	
SHO REFL LF	45.25	0.92	4015.00	3928.00	14
SHO REEL LF	126.61	13.68	3952.00	4062.00	16
LF SHOULDER	154.03	43.29	3958.00	4056.00	
SHO REFL RT	58.57	6.03	4018.00	3923.00	15
SHO REEL RT	104.20	9.06	3952.00	4064.00	17
RT SHOULDER	136.20	39.22	3954.00	4064.00	
TOTAL SHLD REFL	103.60	7.17	4015.00	3923.00	
TOTAL SHLD REEL	230.81	23.06	3952.00	4063.00	
TOTAL SHOULDER	288.92	84.54	3954.00	4057.00	
TOTAL SHO / WT	1.93	0.56	3954.00	4057.00	
LF LAP BELT	31.17	5.03	4007.00	3947.00	8
RT LAP BELT	34.66	7.63	4009.00	3947.00	9
TOTAL LAP	65.40	12.66	4007.00	3947.00	
TOTAL LAP / WT	0.44	0.08	4007.00	3947.00	
CROTCH STRAP	66.71	-18.89	4021.00	3937.00	10
LF SEAT LNK X	45.40	-243.82	3653.00	3934.00	18
RT SEAT LNK X	21.59	-65.10	3985.00	3940.00	19
TOTAL SEAT X	55.95	-303.74	3632.00	3940.00	
SEAT LNK Y	20.66	-147.47	3622.00	3939.00	35
LF SEAT PAN Z	598.54	74.76	3933.00	3674.00	11
RT SEAT PAN Z	473.10	37.26	3934.00	3786.00	12
CT SEAT PAN Z	614.94	47.01	3941.00	3635.00	13
TOTAL SEAT Z	1645.56	173.49	3936.00	3623.00	
TOTAL SEAT Z / WT	10.97	1.16	3936.00	3623.00	
RES SEAT FORCE	1678.21	161.82	3936.00	3623.00	
RES SEAT FORCE / WT	11.19	1.21	3936.00	3623.00	
LF FOOT X	10.52	-111.53	3878.00	3930.00	20
RT FOOT X	25.40	-29.24	3960.00	3915.00	23
CT FOOT X	12.58	-127.85	3877.00	3931.00	26
TOTAL FOOT X	32.56	-258.02	3877.00	3930.00	
LF FOOT Y	116.22	-5.19	3918.00	4004.00	21
RT FOOT Y	22.86	-89.84	3877.00	3919.00	24
CT FOOT Y	4.49	-70.27	3959.00	3928.00	27
TOTAL FOOT Y	44.29	-57.42	3897.00	3929.00	
LF FOOT Z	195.93	6.24	3928.00	3872.00	22
RT FOOT Z	152.64	12.14	3924.00	3876.00	25
CT FOOT Z	78.90	-69.99	3960.00	4047.00	26
TOTAL FOOT Z	307.42	14.18	3924.00	4172.00	
RES FOOT FORCE	381.94	63.96	3929.00	3841.00	

BRACING POSITIONS TEST: 553 SUBJ: G-2 WT: 117.0 G: 10 GP: 1 CELL: K

DATA ID	MAX	MIN	T1	T2	CH
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JOV EXT PWR	10.06	9.95	3830.00	2335.00	48
CARRIAGE X	1.51	-1.17	3859.00	3897.00	36
CARRIAGE Y	0.93	-0.50	3909.00	3930.00	31
CARRIAGE Z	11.14	-0.36	3897.00	3799.00	1
CARRIAGE Z (SM)	10.58	-0.09	3898.00	3798.00	
CARRIAGE VEL	-1.20	-26.19	4150.00	3851.00	29
SEAT Z #2	11.40	-0.17	3906.00	3696.00	38
FOOT PLATE Z	12.47	-0.45	3905.00	3713.00	39
SEAT X	1.98	-1.26	3858.00	3866.00	32
SEAT Y	0.52	-1.20	3879.00	3925.00	33
SEAT Z	11.51	-0.20	3906.00	3811.00	34
SEAT Z (SM)	10.98	-0.10	3906.00	3714.00	
CHEST X	2.82	-1.47	3951.00	3978.00	5
CHEST Y	0.53	-3.02	3977.00	3946.00	6
CHEST Z	16.06	-1.16	3925.00	3827.00	7
CHEST RES	16.06	0.92	3925.00	3601.00	
CHEST SI	28.60		3859.00	3978.00	
HEAD X	.71	-2.63	3727.00	3952.00	2
HEAD Y	2.73	-0.38	3963.00	4051.00	3
HEAD Z	11.03	-1.27	3917.00	3818.00	4
HEAD RES	11.23	0.96	3917.00	4059.00	
HEAD SI	16.69		3867.00	4009.00	
HEAD MIC	13.72		3888.00	3987.00	
SHO REFL LF	42.72	2.94	4005.00	3898.00	14
SHO REEL LF	76.63	7.59	3936.00	4051.00	16
LF SHOULDER	110.38	22.47	3937.00	4062.00	
SHO REFL RT	46.69	7.99	3999.00	3900.00	15
SHO REEL RT	76.12	-4.06	3941.00	4055.00	17
RT SHOULDER	112.00	15.87	3941.00	4064.00	
TOTAL SHO REFL	88.71	10.98	4006.00	3898.00	
TOTAL SHO REEL	150.65	4.65	3940.00	4065.00	
TOTAL SHOULDER	219.82	38.92	3940.00	4063.00	
TOTAL SHO / WT	1.86	0.33	3940.00	4063.00	
LF LAP BELT	20.86	4.25	4010.00	3906.00	8
RT LAP BELT	35.61	6.79	4000.00	3903.00	9
TOTAL LAP	55.21	11.68	3999.00	3904.00	
TOTAL LAP / WT	0.47	0.10	3999.00	3904.00	
CATCH STRAP	87.59	-10.42	4003.00	3921.00	10
LF SEAT LNK X	45.24	-134.51	3802.00	3920.00	18
RT SEAT LNK X	65.16	-0.01	3892.00	4162.00	19
TOTAL SEAT X	77.02	-125.34	3858.00	3921.00	
SEAT LNK Y	38.73	-53.71	4130.00	3909.00	35
LF SEAT PAN Z	347.46	26.99	3914.00	4156.00	11
RT SEAT PAN Z	301.49	19.08	3920.00	3634.00	12
CT SEAT PAN Z	591.08	39.22	3916.00	3616.00	13
TOTAL SEAT Z	1227.09	109.17	3916.00	3616.00	
TOTAL SEAT Z / WT	10.49	0.93	3916.00	3616.00	
RES SEAT FORCE	1232.84	122.14	3916.00	3616.00	
RES SEAT FORCE / WT	10.54	1.04	3916.00	3616.00	
LF FOOT X	15.91	-84.45	3865.00	3696.00	20
RT FOOT X	11.61	-93.25	3863.00	3896.00	23
CT FOOT X	-0.92	-137.17	3863.00	3600.00	26
TOTAL FOOT X	22.74	-268.00	3864.00	3897.00	
LF FOOT Y	75.05	-18.41	3904.00	3805.00	21
RT FOOT Y	26.92	-123.94	3718.00	3905.00	24
CT FOOT Y	28.53	-25.76	3921.00	3899.00	27
TOTAL FOOT Y	53.45	-58.25	3661.00	3966.00	
LF FOOT Z	116.07	-4.02	3899.00	3663.00	22
RT FOOT Z	137.91	9.55	3912.00	4179.00	25
CT FOOT Z	68.82	-107.01	3910.00	3653.00	28
TOTAL FOOT Z	275.77	-24.59	3910.00	4069.00	
RES FOOT FORCE	959.36	40.80	3897.00	4161.00	

BRACING POSITIONS TEST: 534 SUBJ: H-3 WT: 184.0 G: 10 GP: 2 CELL: K

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.02	9.98	789.00	1564.00	48
CARRIAGE X	1.54	-1.52	3824.00	3857.00	36
CARRIAGE Y	1.30	-0.72	3816.00	3812.00	31
CARRIAGE Z	11.94	-0.29	3858.00	3627.00	1
CARRIAGE Z (SM)	10.92	-0.09	3858.00	3626.00	
CARRIAGE VEL	-1.15	-26.17	4191.00	3818.00	29
SEAT Z #2	12.04	-0.19	3864.00	3661.00	38
FOOT PLATE Z	12.48	-0.44	3866.00	3621.00	39
SEAT X	1.89	-1.72	3823.00	3833.00	32
SEAT Y	0.88	-1.06	3822.00	3817.00	33
SEAT Z	11.88	-0.19	3864.00	3659.00	34
SEAT Z (SM)	11.10	-0.10	3866.00	3661.00	
CHEST X	3.16	-0.61	3874.00	3978.00	5
CHEST Y	-0.42	-3.61	3976.00	3866.00	6
CHEST Z	17.12	-0.85	3880.00	3789.00	7
CHEST RES	17.44	0.89	3880.00	3734.00	
CHEST SI	32.67		3821.00	3963.00	
HEAD X	1.67	-3.88	3875.00	3971.00	2
HEAD Y	6.24	-2.19	4017.00	3939.00	3
HEAD Z	10.51	-4.53	3876.00	4020.00	4
HEAD RES	11.22	1.11	3876.00	4046.00	
HEAD SI	16.02		3831.00	3991.00	
HEAD HIC	10.92		3841.00	3904.00	
SHD REFL LF	75.69	5.30	3915.00	3858.00	14
SHD REEL LF	118.40	3.38	3896.00	4023.00	16
LF SHOULDER	179.89	37.92	3904.00	4031.00	
SHD REFL RT	49.00	6.30	3910.00	3859.00	15
SHD REEL RT	127.28	11.46	3901.00	4024.00	17
RT SHOULDER	172.70	31.16	3902.00	4015.00	
TOTAL SHLD REFL	122.87	11.84	3914.00	3858.00	
TOTAL SHLD REEL	244.37	14.91	3898.00	4024.00	
TOTAL SHOULDER	346.36	71.55	3903.00	4024.00	
TOTAL SHD / WT	1.88	0.39	3903.00	4024.00	
LF LAP BELT	46.69	14.65	3965.00	3858.00	8
RT LAP BELT	52.65	19.46	3967.00	3858.00	9
TOTAL LAP	99.09	34.12	3966.00	3858.00	
TOTAL LAP / WT	0.54	0.19	3966.00	3858.00	
CROTCH STRAP	84.82	-11.69	4083.00	3881.00	10
LF SEAT LNK X	28.69	-200.18	3806.00	3876.00	18
RT SEAT LNK X	67.07	-89.72	3934.00	3678.00	19
TOTAL SEAT X	28.78	-288.75	3766.00	3878.00	
SEAT LNK Y	30.48	-48.52	4021.00	3896.00	35
LF SEAT PAN Z	356.27	25.34	3876.00	3631.00	11
RT SEAT PAN Z	551.67	40.04	3876.00	3663.00	12
CT SEAT PAN Z	895.35	64.92	3677.00	3605.00	13
TOTAL SEAT Z	1801.37	143.52	3876.00	3604.00	
TOTAL SEAT Z / WT	9.78	0.78	3876.00	3604.00	
RES SEAT FORCE	1824.46	144.83	3876.00	3604.00	
RES SEAT FORCE / WT	9.92	0.79	3876.00	3604.00	
LF FOOT X	27.86	-117.61	3825.00	3858.00	
RT FOOT X	30.18	-79.96	3825.00	3883.00	23
CT FOOT X	25.04	-203.03	3825.00	3879.00	26
TOTAL FOOT X	63.19	-381.84	3825.00	3858.00	
LF FOOT Y	126.97	-2.31	3865.00	3811.00	21
RT FOOT Y	31.66	-104.11	3919.00	3867.00	24
CT FOOT Y	15.88	-76.68	3827.00	3870.00	27
TOTAL FOOT Y	56.51	-73.48	3844.00	3869.00	
LF FOOT Z	125.09	7.01	3898.00	3825.00	22
RT FOOT Z	200.36	11.84	3873.00	3824.00	25
CT FOOT Z	144.89	-76.14	3877.00	3816.00	28
TOTAL FOOT Z	438.71	15.61	3873.00	3800.00	
RES FOOT FORCE	569.10	74.23	3874.00	3821.00	

BRACING POSITIONS TEST: 540 SUBJ: H-S WT: 197.0 G: 10 GP: 2 CELL: K

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.03	9.98	67.00	476.00	48
CARRIAGE X	1.43	-0.93	3869.00	3905.00	36
CARRIAGE Y	0.88	-0.75	3919.00	3883.00	31
CARRIAGE Z	10.69	-0.41	3907.00	3822.00	1
CARRIAGE Z (SM)	10.27	-0.11	3908.00	3824.00	
CARRIAGE VEL	-1.22	-26.25	4158.00	3862.00	29
SEAT Z *2	12.80	-0.26	3913.00	3829.00	38
FOOT PLATE Z	13.13	-0.44	3915.00	3715.00	99
SEAT X	2.28	-1.20	3869.00	3905.00	32
SEAT Y	1.08	-1.34	3866.00	3872.00	33
SEAT Z	12.36	-0.24	3913.00	3720.00	34
SEAT Z (SM)	11.42	-0.12	3914.00	3721.00	
CHEST X	3.58	-3.65	3958.00	3928.00	5
CHEST Y	2.15	-3.72	3983.00	3934.00	6
CHEST Z	16.52	-1.80	3930.00	3985.00	7
CHEST RES	17.08	1.04	3930.00	3860.00	
CHEST SI	26.93		3869.00	3979.00	
HEAD X	1.73	-2.02	3921.00	3957.00	23
HEAD Y	2.17	-0.45	4032.00	3993.00	
HEAD Z	11.34	-3.19	3925.00	4058.00	
HEAD RES	11.44	0.97	3925.00	4127.00	
HEAD SI	16.34		3873.00	3997.00	
HEAD MIC	13.26		3878.00	3975.00	
SHD REFL LF	44.52	2.97	4002.00	3907.00	14
SHD REEL LF	99.29	10.83	3942.00	4064.00	16
LF SHOULDER	136.61	43.23	3913.00	4065.00	
SHD REFL RT	56.84	21.24	4008.00	3911.00	15
SHD REEL RT	121.58	27.15	3942.00	4049.00	17
RT SHOULDER	173.94	56.99	3943.00	4047.00	
TOTAL SHLD REFL	99.68	24.43	4007.00	3907.00	
TOTAL SHLD REEL	220.86	40.68	3942.00	4060.00	
TOTAL SHOULDER	310.55	103.44	3943.00	4048.00	
TOTAL SHD / WT	2.27	0.78	3943.00	4048.00	
LF LAP BELT	32.19	0.17	4009.00	3928.00	8
RT LAP BELT	45.88	8.71	4011.00	3939.00	9
TOTAL LAP	77.83	11.09	4010.00	3927.00	
TOTAL LAP / WT	0.57	0.08	4010.00	3927.00	
CROTCH STRAP	121.19	-4.64	4013.00	3931.00	10
LF SEAT LNK X	44.57	-177.24	4016.00	3923.00	16
RT SEAT LNK X	54.90	-24.42	3870.00	3924.00	19
TOTAL SEAT X	56.24	-201.09	4002.00	3924.00	
SEAT LNK Y	64.32	-36.56	3989.00	3918.00	35
LF SEAT PAN Z	325.10	41.60	3918.00	3627.00	11
RT SEAT PAN Z	286.06	15.00	3925.00	3637.00	12
CT SEAT PAN Z	865.92	79.89	3925.00	3609.00	13
TOTAL SEAT Z	1466.82	148.80	3925.00	3609.00	
TOTAL SEAT Z / WT	10.71	1.09	3925.00	3609.00	
RES SEAT FORCE	1480.39	154.17	3925.00	3609.00	
RES SEAT FORCE / WT	10.81	1.13	3925.00	3609.00	
LF FOOT X	-2.53	-152.62	3870.00	3929.00	20
RT FOOT X	23.83	-60.77	3897.00	3929.00	23
CT FOOT X	-3.04	-196.24	3871.00	3930.00	26
TOTAL FOOT X	3.27	-407.63	3871.00	3930.00	
LF FOOT Y	125.36	-5.66	3916.00	3725.00	21
RT FOOT Y	23.52	-99.84	3870.00	3915.00	24
CT FOOT Y	-0.30	-67.94	4023.00	3911.00	27
TOTAL FOOT Y	30.89	-64.27	3941.00	3879.00	
LF FOOT Z	160.85	18.25	3920.00	4192.00	22
RT FOOT Z	147.70	13.22	3922.00	3870.00	25
CT FOOT Z	80.15	-100.35	3924.00	3636.00	
TOTAL FOOT Z	332.74	17.60	3919.00	3842.00	
RES FOOT FORCE	499.40	76.44	3921.00	3872.00	

BRACING POSITIONS TEST: 531 SUBJ: M10 WT: 144.0 G: 10 GP: 1 CELL: K

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.02	9.98	94.00	22.00	48
CARRIAGE X	1.31	-1.17	3920.00	3914.00	36
CARRIAGE Y	0.84	-0.46	3921.00	4049.00	31
CARRIAGE Z	11.82	-0.24	3916.00	3737.00	
CARRIAGE Z (SM)	10.87	-0.07	3915.00	3723.00	
CARRIAGE VEL	-1.22	-26.17	4167.00	3878.00	29
SEAT Z *2	12.38	-0.24	3922.00	3745.00	38
FOOT PLATE Z	12.52	-0.58	3925.00	3729.00	39
SEAT X	1.43	-1.30	3920.00	3893.00	32
SEAT Y	0.54	-1.00	3879.00	3922.00	33
SEAT Z	12.44	-0.17	3922.00	3745.00	34
SEAT Z (SM)	11.35	-0.09	3922.00	3611.00	
CHEST X	2.17	-0.71	3968.00	4025.00	5
CHEST Y	-0.91	-3.30	4010.00	3944.00	6
CHEST Z	19.76	-0.89	3939.00	3805.00	7
CHEST RES	19.92	1.11	3939.00	4020.00	
CHEST SI	29.04		3861.00	4004.00	
HEAD X	2.19	-1.32	3935.00	3950.00	2
HEAD Y	3.16	-0.71	4006.00	4024.00	3
HEAD Z	10.80	-3.57	3934.00	4024.00	4
HEAD RES	11.09	1.25	3934.00	4036.00	
HEAD SI	15.44		3891.00	4012.00	
HEAD MIC	12.85		3903.00	3980.00	
SHD REFL LF	36.12	3.60	4043.00	3916.00	14
SHD REEL LF	77.89	13.72	3954.00	4099.00	16
LF SHOULDER	101.42	29.38	3954.00	3916.00	
SHD REFL RT	54.43	22.48	4016.00	3918.00	15
SHD REEL RT	77.57	8.71	3952.00	3987.00	17
RT SHOULDER	120.12	40.03	3951.00	4096.00	
TOTAL SHD REFL	88.21	26.27	4023.00	3916.00	
TOTAL SHD REEL	154.70	27.68	3953.00	4100.00	
TOTAL SHOULDER	221.02	74.06	3952.00	4091.00	
TOTAL SHD / WT	1.53	0.51	3952.00	4091.00	
LF LAP BELT	35.02	11.41	4020.00	3941.00	8
RT LAP BELT	38.38	5.96	4021.00	3923.00	
TOTAL LAP	73.36	18.21	4021.00	3923.00	
TOTAL LAP / WT	0.51	0.13	4021.00	3923.00	
CROTCH STRAP	69.42	-4.34	4035.00	3916.00	10
LF SEAT LNK X	45.57	-196.40	4195.00	3934.00	18
RT SEAT LNK X	50.73	-4.61	3900.00	3836.00	19
TOTAL SEAT X	61.56	-198.67	4033.00	3935.00	
SEAT LNK Y	44.71	-68.31	4039.00	3928.00	35
LF SEAT PAN Z	399.80	32.65	3931.00	3640.00	11
RT SEAT PAN Z	351.84	20.10	3931.00	3748.00	12
CT SEAT PAN Z	800.45	56.32	3932.00	3609.00	13
TOTAL SEAT Z	1546.81	122.65	3931.00	3602.00	
TOTAL SEAT Z / WT	10.76	0.85	3931.00	3602.00	
RES SEAT FORCE	1582.00	129.73	3931.00	3602.00	
RES SEAT FORCE / WT	10.85	0.90	3931.00	3602.00	
LF FOOT X	11.68	-113.09	3882.00	3929.00	20
RT FOOT X	36.14	-41.17	3883.00	3932.00	23
CT FOOT X	18.55	-169.28	3882.00	3934.00	26
TOTAL FOOT X	87.49	-307.29	3882.00	3932.00	
LF FOOT Y	106.13	-8.30	3926.00	3872.00	21
RT FOOT Y	15.71	-77.47	4054.00	3925.00	24
CT FOOT Y	17.28	-62.81	3750.00	3927.00	27
TOTAL FOOT Y	41.54	-42.46	3898.00	3921.00	
LF FOOT Z	124.39	-22.77	3929.00	3889.00	22
RT FOOT Z	133.00	-9.14	3925.00	3879.00	25
CT FOOT Z	107.68	-36.09	3924.00	3675.00	
TOTAL FOOT Z	333.96	-8.56	3929.00	3873.00	
RES FOOT FORCE	446.13	49.70	3929.00	4012.00	

BRACING POSITIONS TEST: 542 SUBJ: M11 WT: 158.0 G: 10 GP: 1 CELL: K

DATA ID	MAX	MIN	T1	T2	CM
1DV EXT PWR	10.03	9.98	1181.00	2168.00	48
CARRIAGE X	1.28	-1.31	3873.00	3906.00	36
CARRIAGE Y	0.99	-0.62	3864.00	3859.00	31
CARRIAGE Z	12.10	-0.25	3907.00	3808.00	1
CARRIAGE Z (SM)	10.91	-0.10	3907.00	3600.00	
CARRIAGE VEL	-1.27	-26.32	4200.00	3865.00	29
SEAT Z *2	11.87	-0.16	3913.00	3723.00	38
FOOT PLATE Z	11.55	-0.41	3918.00	3716.00	39
SEAT X	1.39	-1.94	3871.00	3883.00	32
SEAT Y	0.50	-0.90	3883.00	3892.00	33
SEAT Z	11.65	-0.15	3913.00	3725.00	34
SEAT Z (SM)	11.12	-0.08	3915.00	3738.00	
CHEST X	2.35	-0.77	3923.00	4043.00	5
CHEST Y	0.02	-2.62	3910.00	3989.00	6
CHEST Z	16.33	-1.30	3931.00	3858.00	7
CHEST RES	16.35	1.22	3931.00	4092.00	
CHEST SI	27.03		3871.00	4013.00	
HEAD X	1.84	-4.37	3920.00	3997.00	2
HEAD Y	3.86	-0.18	3976.00	3999.00	3
HEAD Z	10.54	-5.08	3925.00	4065.00	4
HEAD RES	10.72	0.84	3925.00	4103.00	
HEAD SI	15.83		3877.00	4019.00	
HEAD HIC	13.06		3885.00	4007.00	
SHD REFL LF	40.95	1.46	4001.00	3910.00	14
SHD REEL LF	66.25	3.89	3946.00	4063.00	16
LF SHOULDER	117.54	24.18	3998.00	4068.00	
SHD REFL RT	37.70	5.47	4009.00	3918.00	15
SHD REEL RT	91.88	-1.46	3944.00	4048.00	17
RT SHOULDER	110.87	18.55	3944.00	3907.00	
TOTAL SHLD REFL	77.80	7.17	4009.00	3910.00	
TOTAL SHLD REEL	177.68	3.96	3945.00	4062.00	
TOTAL SHOULDER	220.96	46.23	3945.00	4061.00	
TOTAL SHD / WT	1.40	0.29	3945.00	4061.00	
LF LAP BELT	34.52	11.53	4077.00	3907.00	8
RT LAP BELT	42.90	12.98	4005.00	3907.00	9
TOTAL LAP	76.58	24.51	4004.00	3907.00	
TOTAL LAP / WT	0.48	0.16	4004.00	3907.00	
CROTCH STRAP	94.41	-37.37	4090.00	3927.00	10
LF SEAT LNK X	25.04	-230.19	3849.00	3927.00	18
RT SEAT LNK X	37.99	-75.77	3978.00	3929.00	19
TOTAL SEAT X	30.48	-303.49	3841.00	3927.00	
SEAT LNK Y	27.61	-70.64	3819.00	3921.00	35
LF SEAT PAN Z	418.10	42.38	3921.00	3806.00	11
RT SEAT PAN Z	490.33	31.39	3924.00	3617.00	12
CT SEAT PAN Z	829.18	78.08	3927.00	3620.00	13
TOTAL SEAT Z	1724.96	163.59	3924.00	3617.00	
TOTAL SEAT Z / WT	10.92	1.04	3924.00	3617.00	
RES SEAT FORCE	1752.22	166.96	3924.00	3617.00	
RES SEAT FORCE / WT	11.09	1.06	3924.00	3617.00	
LF FOOT X	9.31	-151.62	3874.00	3927.00	20
RT FOOT X	33.43	-60.85	3873.00	3926.00	23
CT FOOT X	10.48	-176.45	3873.00	3926.00	26
TOTAL FOOT X	48.81	-386.27	3874.00	3927.00	
LF FOOT Y	115.39	-12.14	3919.00	3981.00	21
RT FOOT Y	28.34	-99.45	3950.00	3918.00	24
CT FOOT Y	16.68	-51.85	3723.00	3924.00	27
TOTAL FOOT Y	40.30	-55.75	3970.00	3926.00	
LF FOOT Z	158.63	0.77	3918.00	3977.00	22
RT FOOT Z	168.73	2.30	3926.00	4035.00	25
CT FOOT Z	97.68	-69.63	3903.00	3735.00	28
TOTAL FOOT Z	360.34	12.52	3920.00	4184.00	
RES FOOT FORCE	514.94	45.02	3926.00	4023.00	

BRACING POSITIONS TEST: 536 SUBJ: M13 WT: 172.0 G: 10 GP: 1 CELL: K

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.03	9.98	453.00	771.00	48
CARRIAGE X	1.35	-1.18	3878.00	3866.00	36
CARRIAGE Y	0.91	-0.83	3903.00	3868.00	31
CARRIAGE Z	11.32	-0.34	3888.00	3789.00	
CARRIAGE Z (SM)	10.66	-0.10	3888.00	3789.00	
CARRIAGE VEL	-1.19	-26.18	4146.00	3842.00	29
SEAT Z #2	12.17	-0.15	3895.00	3691.00	33
FOOT PLATE Z	12.61	-0.59	3898.00	3695.00	39
SEAT X	2.24	-1.40	3851.00	3863.00	32
SEAT Y	0.62	-1.27	3850.00	3872.00	33
SEAT Z	12.13	-0.21	3895.00	3693.00	34
SEAT Z (SM)	11.30	-0.13	3896.00	3693.00	
CHEST X	1.70	-0.55	3904.00	3996.00	5
CHEST Y	-0.07	-2.85	3955.00	3913.00	6
CHEST Z	17.87	-1.23	3912.00	3819.00	7
CHEST RES	18.22	1.03	3912.00	3610.00	
CHEST SI	30.07		3849.00	3960.00	
HEAD X	.56	-2.79	3872.00	3942.00	2
HEAD Y	4.03	0.96	3996.00	4075.00	3
HEAD Z	11.20	-1.64	3908.00	3815.00	4
HEAD RES	11.31	1.12	3908.00	4072.00	
HEAD SI	15.69		3859.00	4020.00	
HEAD MIC	11.59		3867.00	3954.00	
SHO REFL LF	53.53	2.34	3981.00	3892.00	14
SHO REEL LF	106.78	13.57	3920.00	4043.00	16
LF SHOULDER	133.23	43.32	3926.00	4046.00	
SHO REFL RT	46.73	10.41	3982.00	3890.00	15
SHO REEL RT	131.18	22.60	3924.00	4044.00	17
RT SHOULDER	164.85	43.71	3924.00	4031.00	
TOTAL SHLD REFL	100.21	13.18	3981.00	3881.00	
TOTAL SHLD REEL	239.46	36.19	3923.00	4043.00	
TOTAL SHOULDER	297.63	91.77	3925.00	4044.00	
TOTAL SHD / WT	1.73	0.53	3925.00	4044.00	
LF LAP BELT	31.83	9.74	3982.00	3904.00	8
RT LAP BELT	51.48	19.02	3988.00	3892.00	9
TOTAL LAP	82.84	29.45	3988.00	3892.00	
TOTAL LAP / WT	0.48	0.17	3988.00	3892.00	
CROTCH STRAP	94.16	3.29	3995.00	3910.00	10
LF SEAT LNK X	44.34	-199.94	3835.00	3907.00	18
RT SEAT LNK X	31.83	-87.46	3959.00	3904.00	19
TOTAL SEAT X	30.95	-287.40	3989.00	3907.00	
SEAT LNK Y	42.72	-56.94	3988.00	3904.00	35
LF SEAT PAN Z	335.58	33.36	3903.00	3608.00	11
RT SEAT PAN Z	453.14	32.18	3910.00	3631.00	12
CT SEAT PAN Z	1048.68	55.30	3906.00	3606.00	13
TOTAL SEAT Z	1825.69	131.34	3906.00	3610.00	
TOTAL SEAT Z / WT	10.61	0.76	3906.00	3610.00	
RES SEAT FORCE	1848.25	133.31	3906.00	3610.00	
RES SEAT FORCE / WT	10.75	0.78	3906.00	3610.00	
LF FOOT X	24.69	-139.92	3853.00	3911.00	20
RT FOOT X	42.38	-77.45	3852.00	3910.00	23
CT FOOT X	24.74	-205.13	3852.00	3912.00	26
TOTAL FOOT X	89.10	-421.60	3853.00	3912.00	
LF FOOT Y	116.59	-16.18	3900.00	3863.00	21
RT FOOT Y	24.16	-117.83	3932.00	3899.00	24
CT FOOT Y	19.21	-50.21	3875.00	3903.00	27
TOTAL FOOT Y	52.72	-59.95	3873.00	3863.00	
LF FOOT Z	168.21	-4.71	3912.00	3854.00	22
RT FOOT Z	175.25	-8.05	3909.00	3851.00	25
CT FOOT Z	147.02	-94.92	3907.00	3609.00	28
TOTAL FOOT Z	444.56	9.93	3908.00	3805.00	
RES FOOT FORCE	603.70	36.92	3912.00	3974.00	

BRACING POSITIONS TEST: 544 SUBJ: P-3 WT: 201.0 G: 10 GP: 2 CELL: K

DATA ID	MAX	MIN	T1	T2	CN
IOV EXT PWR	10.03	9.98	1447.00	35.00	48
CARRIAGE X	1.14	-0.93	3681.00	3916.00	36
CARRIAGE Y	0.86	-0.77	3933.00	3870.00	31
CARRIAGE Z	10.83	-0.18	3920.00	3677.00	1
CARRIAGE Z (SM)	10.26	-0.05	3920.00	3719.00	
CARRIAGE VEL	-1.24	-26.36	4197.00	3874.00	29
SEAT Z <sup>#2</sup>	12.20	-0.18	3928.00	3732.00	38
FOOT PLATE Z	19.01	-0.59	3929.00	3731.00	39
SEAT X	1.33	-1.01	3880.00	3893.00	32
SEAT Y	0.56	-0.83	3838.00	3848.00	33
SEAT Z	12.23	-0.19	3927.00	3727.00	34
SEAT Z (SM)	11.44	-0.13	3928.00	3728.00	
CHEST X	4.09	-0.50	3938.00	4131.00	5
CHEST Y	0.62	-2.05	3930.00	3984.00	6
CHEST Z	13.98	-1.60	3943.00	3815.00	7
CHEST RES	14.34	0.97	3943.00	3878.00	
CHEST SI	24.47		3885.00	3997.00	
HEAD X	.53	-2.65	3881.00	4027.00	2
HEAD Y	2.29	0.35	4021.00	4078.00	3
HEAD Z	10.27	-3.20	3937.00	4070.00	4
HEAD RES	10.41	1.30	3937.00	4082.00	
HEAD SI	13.78		3893.00	4037.00	
HEAD MIC	11.10		3909.00	3972.00	
SHD REFL LF	71.24	15.67	3991.00	3920.00	
SHD REEL LF	129.47	13.68	3956.00	4079.00	16
LF SHOULDER	175.84	59.75	3956.00	4080.00	
SHD REFL RT	96.59	23.15	3987.00	3926.00	15
SHD REEL RT	124.18	12.11	3955.00	4081.00	17
RT SHOULDER	181.76	62.74	3963.00	4075.00	
TOTAL SHLD REFL	167.05	39.70	3989.00	3920.00	
TOTAL SHLD REEL	247.58	26.19	3955.00	4080.00	
TOTAL SHOULDER	356.23	124.17	3957.00	4080.00	
TOTAL SHD / WT	1.77	0.62	3957.00	4060.00	
LF LAP BELT	84.20	29.04	4006.00	3934.00	8
RT LAP BELT	74.22	29.55	4028.00	3929.00	9
TOTAL LAP	195.79	61.34	4018.00	3929.00	
TOTAL LAP / WT	0.68	0.31	4018.00	3929.00	
CROTCH STRAP	185.01	-12.18	4050.00	3942.00	10
LF SEAT LNK X	44.21	-242.70	3825.00	3936.00	18
RT SEAT LNK X	16.92	-78.52	3983.00	3912.00	19
TOTAL SEAT X	66.46	-316.30	4150.00	3938.00	
SEAT LNK Y	54.85	-101.32	4102.00	3930.00	35
LF SEAT PAN Z	516.08	68.58	3933.00	3600.00	11
RT SEAT PAN Z	492.85	59.79	3946.00	3610.00	12
CT SEAT PAN Z	1156.01	152.17	3940.00	3605.00	13
TOTAL SEAT Z	2140.82	292.06	3940.00	3601.00	
TOTAL SEAT Z / WT	10.65	1.45	3940.00	3601.00	
RES SEAT FORCE	2185.82	283.76	3940.00	3601.00	
RES SEAT FORCE / WT	10.77	1.46	3940.00	3601.00	
LF FOOT X	9.45	-133.07	3883.00	3943.00	20
RT FOOT X	34.38	-90.74	3882.00	3953.00	23
CT FOOT X	11.70	-177.02	3882.00	3953.00	26
TOTAL FOOT X	47.77	-379.51	3883.00	3944.00	
LF FOOT Y	104.40	-22.26	3952.00	3892.00	21
RT FOOT Y	16.24	-114.21	3974.00	3926.00	24
CT FOOT Y	27.98	-32.25	3904.00	3958.00	27
TOTAL FOOT Y	92.34	-46.21	3886.00	3893.00	
LF FOOT Z	168.94	1.12	3934.00	3882.00	22
RT FOOT Z	170.20	-1.80	3950.00	3910.00	25
CT FOOT Z	156.71	-63.73	3946.00	3605.00	
TOTAL FOOT Z	494.95	19.03	3946.00	4009.00	
RES FOOT FORCE	565.30	58.16	3944.00	3879.00	

BRACING POSITIONS TEST: 537 SUBJ: R-2 WT: 141.0 C: 10 GP: 1 CELL: K

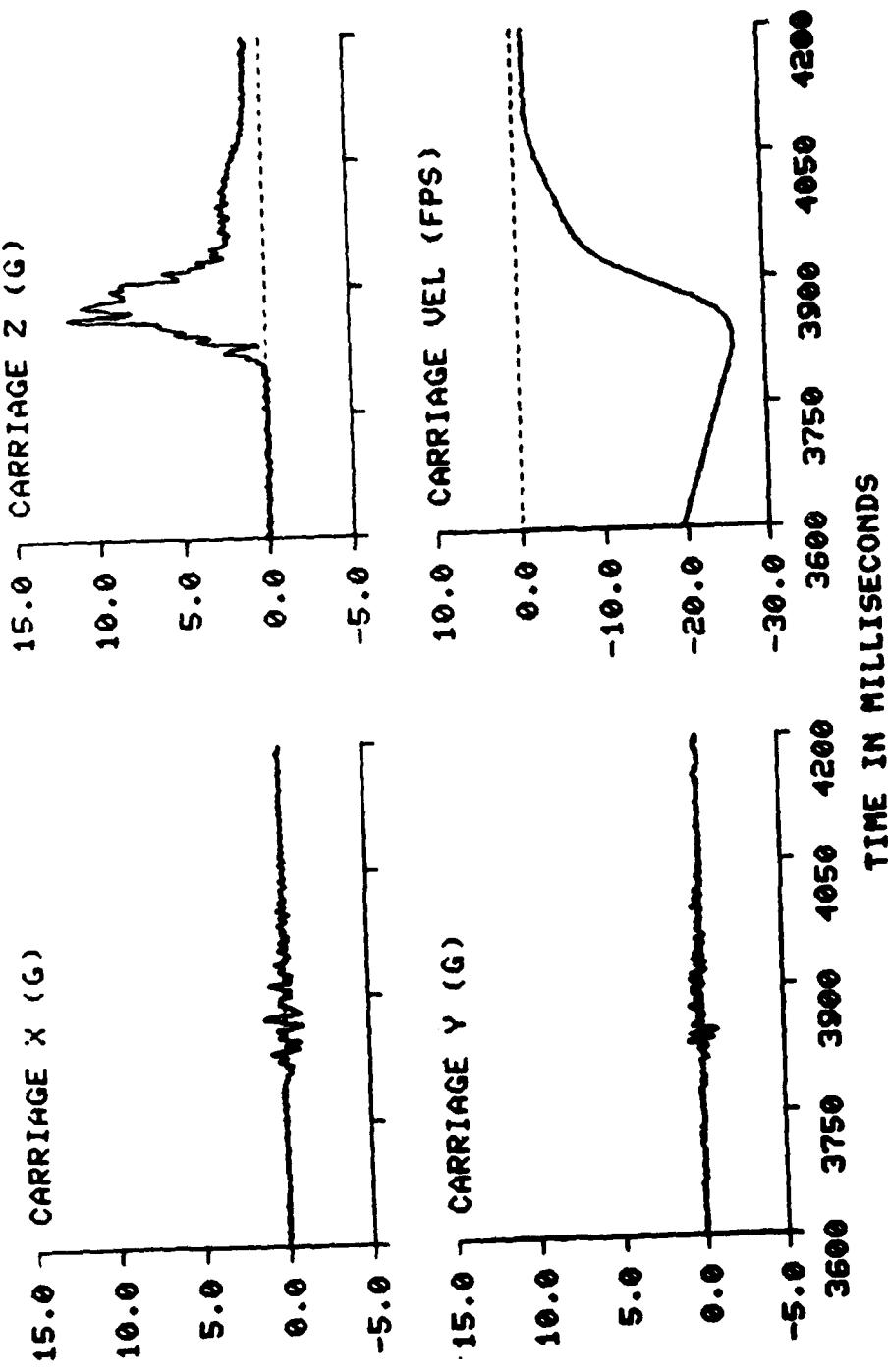
DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.03	9.98	636.00	468.00	48
CARRIAGE X	1.20	-1.20	3862.00	3897.00	36
CARRIAGE Y	0.72	-0.64	3853.00	3933.00	31
CARRIAGE Z	11.43	-0.15	3898.00	3636.00	1
CARRIAGE Z (SM)	10.61	-0.05	3898.00	3685.00	
CARRIAGE VEL	-1.16	-26.24	4158.00	3864.00	29
SEAT Z *2	12.66	-0.20	3905.00	3720.00	38
FOOT PLATE Z	11.99	-0.47	3908.00	3711.00	39
SEAT X	1.95	-1.31	3860.00	3897.00	32
SEAT Y	0.74	-0.90	3873.00	3893.00	33
SEAT Z	12.45	-0.20	3905.00	3717.00	34
SEAT Z (SM)	11.28	-0.11	3905.00	3718.00	
CHEST X	3.52	-0.69	3916.00	4012.00	5
CHEST Y	-0.42	-3.32	3974.00	3937.00	6
CHEST Z	13.05	-1.45	3917.00	3822.00	7
CHEST RES	13.75	1.03	3917.00	4144.00	
CHEST SI	24.38		3861.00	3975.00	
HEAD X	0.36	-5.15	3693.00	3993.00	2
HEAD Y	1.85	0.02	3983.00	4006.00	3
HEAD Z	9.81	-1.19	3911.00	3674.00	4
HEAD RES	10.89	0.92	3919.00	4197.00	
HEAD SI	15.72		3865.00	4055.00	
HEAD HIC	10.13		3883.00	3946.00	
SHO REFL LF	43.64	-0.42	3985.00	3904.00	14
SHO REEL LF	73.24	3.93	3936.00	4074.00	16
LF SHOULDER	94.41	17.30	3942.00	3903.00	
SHO REFL RT	29.58	4.11	3952.00	3908.00	15
SHO REEL RT	73.50	2.57	3944.00	4078.00	17
RT SHOULDER	100.56	19.31	3944.00	3902.00	
TOTAL SHLD REFL	70.41	3.84	3992.00	3904.00	
TOTAL SHLD REEL	145.73	7.00	3937.00	4076.00	
TOTAL SHOULDER	194.45	36.85	3943.00	3903.00	
TOTAL SHD / WT	1.38	0.26	3943.00	3903.00	
LF LAP BELT	31.07	2.99	4094.00	3908.00	8
RT LAP BELT	34.69	4.62	4004.00	3911.00	9
TOTAL LAP	62.98	7.76	4004.00	3910.00	
TOTAL LAP / WT	0.45	0.06	4004.00	3910.00	
CROTCH STRAP	68.49	-1.56	4097.00	3918.00	10
LF SEAT LNK X	51.78	-165.42	4169.00	3913.00	18
RT SEAT LNK X	55.88	-16.68	3861.00	3916.00	19
TOTAL SEAT X	61.47	-180.90	4104.00	3914.00	
SEAT LNK Y	60.32	-25.97	4100.00	3910.00	35
LF SEAT PAN Z	259.25	17.89	3913.00	3638.00	11
RT SEAT PAN Z	293.13	16.41	3915.00	3643.00	12
CT SEAT PAN Z	985.97	94.25	3916.00	3601.00	13
TOTAL SEAT Z	1530.82	139.53	3915.00	3601.00	
TOTAL SEAT Z / WT	10.86	0.99	3915.00	3601.00	
RES SEAT FORCE	1541.52	143.49	3915.00	3601.00	
RES SEAT FORCE / WT	10.93	1.02	3915.00	3601.00	
LF FOOT X	4.43	-158.31	3863.00	3921.00	20
RT FOOT X	93.70	-84.38	3864.00	3919.00	23
CT FOOT X	14.47	-193.03	3863.00	3920.00	26
TOTAL FOOT X	49.07	-431.27	3863.00	3921.00	
LF FOOT Y	116.05	-7.11	3904.00	3852.00	21
RT FOOT Y	20.89	-98.91	3959.00	3912.00	24
CT FOOT Y	7.05	-57.92	3723.00	3911.00	27
TOTAL FOOT Y	53.65	-53.46	3681.00	3916.00	
LF FOOT Z	144.21	-0.74	3920.00	3904.00	22
RT FOOT Z	184.39	1.73	3914.00	3859.00	25
CT FOOT Z	78.00	-60.53	3916.00	3856.00	26
TOTAL FOOT Z	368.84	0.04	3910.00	3642.00	
RES FOOT FORCE	532.23	43.54	3913.00	4170.00	

BRACING POSITIONS TEST: 546 SUBJ: S-3 WT: 170.0 G: 10 GP: 1 CELL: K

DATA ID	MAX	MIN	T1	T2	CH
IOV EXT PHR	10.03	9.98	3843.00	51.00	48
CARRIAGE X	1.46	-1.36	3843.00	3850.00	36
CARRIAGE Y	0.76	-0.75	3835.00	3915.00	31
CARRIAGE Z	10.77	-0.19	3879.00	3630.00	1
CARRIAGE Z (SM)	10.19	-0.06	3879.00	3685.00	
CARRIAGE VEL	-1.09	-26.20	4175.00	3835.00	29
SEAT Z *2	12.54	-0.17	3885.00	3660.00	38
FOOT PLATE Z	12.56	-0.54	3889.00	3667.00	39
SEAT X	1.36	-1.72	3844.00	3851.00	32
SEAT Y	1.10	-1.13	3841.00	3848.00	33
SEAT Z	12.51	-0.20	3865.00	3661.00	34
SEAT Z (SM)	11.36	-0.11	3886.00	3661.00	
CHEST X	9.38	-0.60	3893.00	3984.00	5
CHEST Y	-0.81	-2.71	3699.00	3928.00	6
CHEST Z	17.77	-1.42	3901.00	3791.00	7
CHEST RES	17.97	1.03	3901.00	3833.00	
CHEST SI	32.00		3843.00	3963.00	
HEAD X	1.94	-2.63	3895.00	3920.00	23
HEAD Y	6.24	-0.85	3951.00	4018.00	4
HEAD Z	11.71	-3.16	3898.00	4011.00	
HEAD RES	11.67	0.70	3898.00	4001.00	
HEAD SI	17.15		3849.00	3985.00	
HEAD MIC	12.08		3868.00	3934.00	
SHO REFL LF	46.30	5.30	3938.00	3882.00	14
SHO REFL LF	125.88	23.12	3915.00	4036.00	16
LF SHOULDER	167.76	47.99	3915.00	4024.00	
SHO REFL RT	52.02	6.90	3937.00	3883.00	15
SHO REEL RT	108.88	9.02	3915.00	4030.00	
RT SHOULDER	146.78	31.54	3916.00	4034.00	17
TOTAL SHO REFL	98.23	12.22	3938.00	3882.00	
TOTAL SHO REEL	235.66	33.24	3915.00	4035.00	
TOTAL SHOULDER	314.23	81.96	3915.00	4033.00	
TOTAL SHO / WT	1.05	0.46	3915.00	4033.00	
LF LAP BELT	37.81	24.98	3961.00	4048.00	8
RT LAP BELT	41.91	23.94	3981.00	3887.00	9
TOTAL LAP	78.29	50.35	3980.00	3887.00	
TOTAL LAP / WT	0.46	0.30	3980.00	3887.00	
CROTCH STRAP	46.48	-52.52	3993.00	3903.00	
LF SEAT LNK X	16.07	-242.61	3695.00	3898.00	10
RT SEAT LNK X	27.85	-78.75	3947.00	3899.00	18
TOTAL SEAT X	12.23	-319.28	3806.00	3898.00	
SEAT LNK Y	18.29	-111.75	3634.00	3897.00	35
LF SEAT PAN Z	533.00	61.52	3897.00	3616.00	
RT SEAT PAN Z	519.91	47.27	3898.00	3617.00	11
CT SEAT PAN Z	788.22	49.16	3899.00	3601.00	12
TOTAL SEAT Z	1835.31	170.70	3899.00	3601.00	
TOTAL SEAT Z / WT	10.60	1.00	3899.00	3601.00	
RES SEAT FORCE	1865.95	171.43	3899.00	3601.00	
RES SEAT FORCE / WT	10.98	1.01	3393.00	3601.00	
LF FOOT X	21.55	-125.72	3844.00	3903.00	20
RT FOOT X	24.80	-60.68	3841.00	3876.00	23
CT FOOT X	32.57	-172.25	3844.00	3903.00	26
TOTAL FOOT X	66.59	-347.02	3844.00	3903.00	
LF FOOT Y	95.99	-24.54	3891.00	3654.00	21
RT FOOT Y	24.39	-100.74	3843.00	3889.00	24
CT FOOT Y	46.30	-37.36	3664.00	3854.00	27
TOTAL FOOT Y	64.48	-35.99	3863.00	3849.00	
LF FOOT Z	136.89	-98.09	3902.00	3870.00	22
RT FOOT Z	118.20	-20.05	3891.00	3843.00	25
CT FOOT Z	157.61	-54.72	3897.00	3897.00	
TOTAL FOOT Z	367.32	5.05	3892.00	3897.00	
RES FOOT FORCE	474.36	37.46	3892.00	3846.00	

BRACING POSITIONS STUDY

TEST: 553      SUBJ: F-2



BRACING POSITIONS STUDY

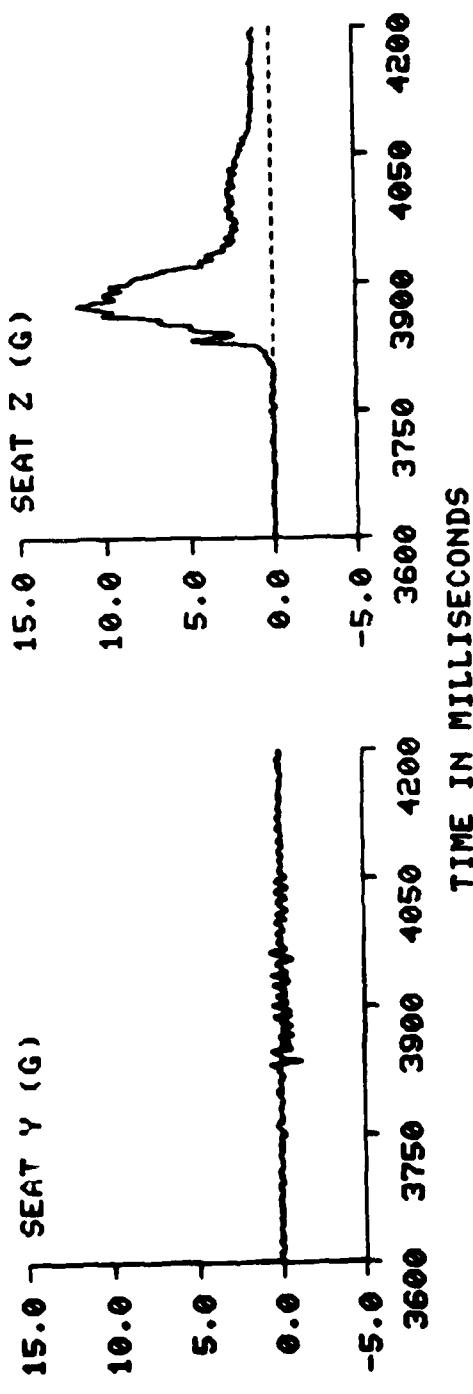
TEST: 555

SUBJ: F-2

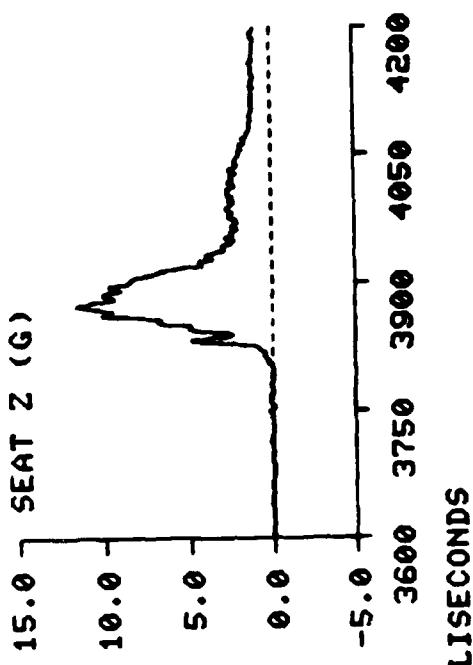
SEAT X (G)



SEAT Y (G)



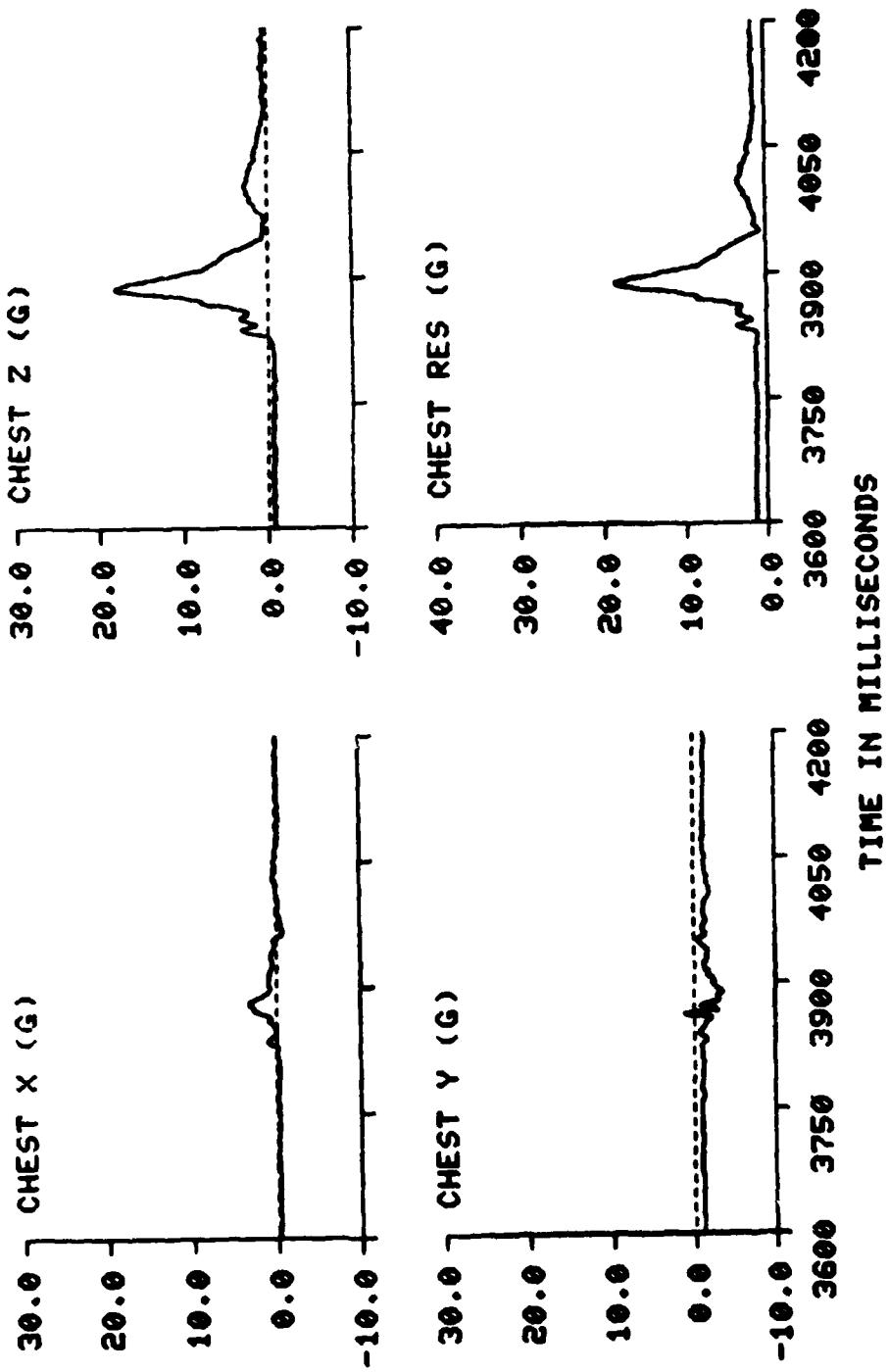
SEAT Z (G)



BRACING POSITIONS STUDY

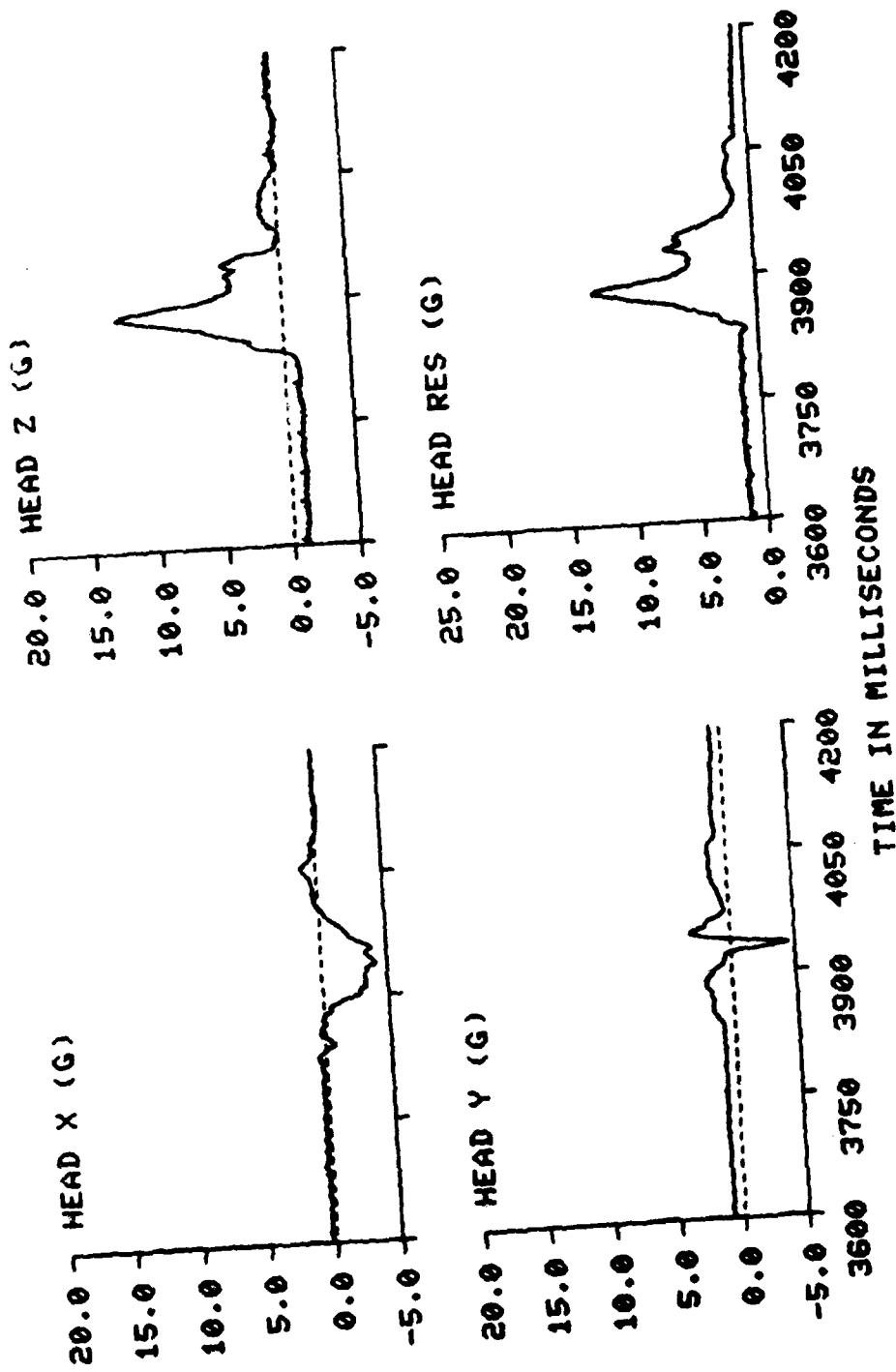
TEST: 553

SUBJ: F-2



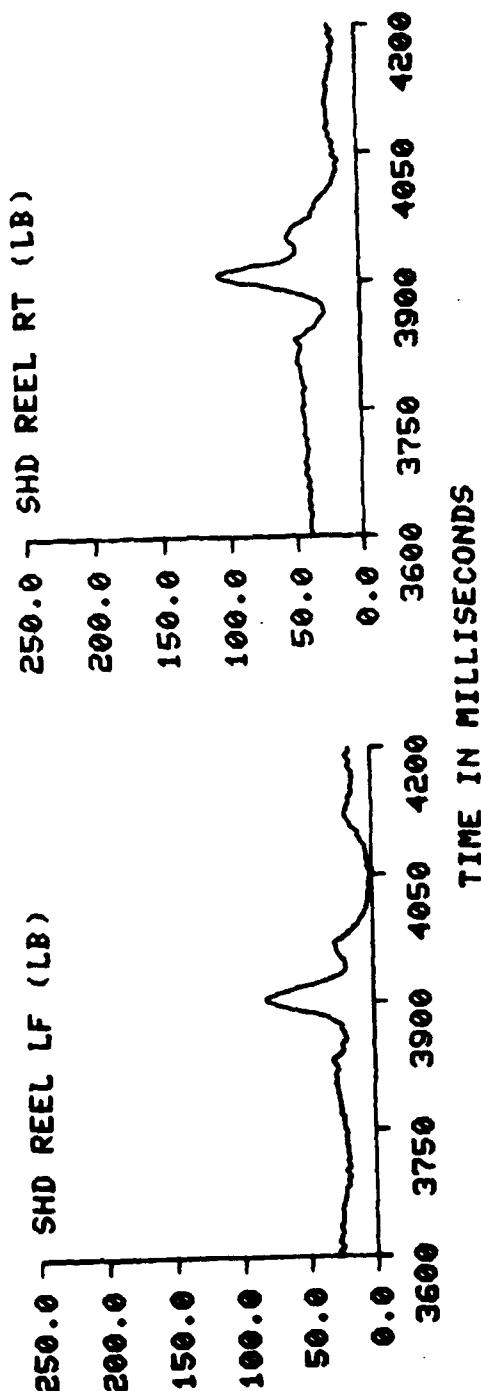
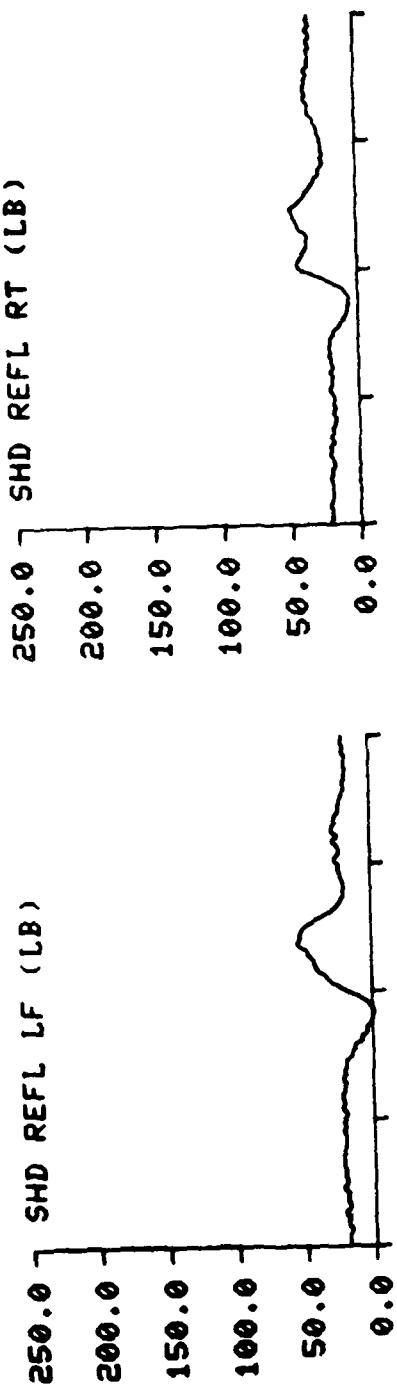
BRAACING POSITIONS STUDY

TEST: 553 SUBJ: F-2



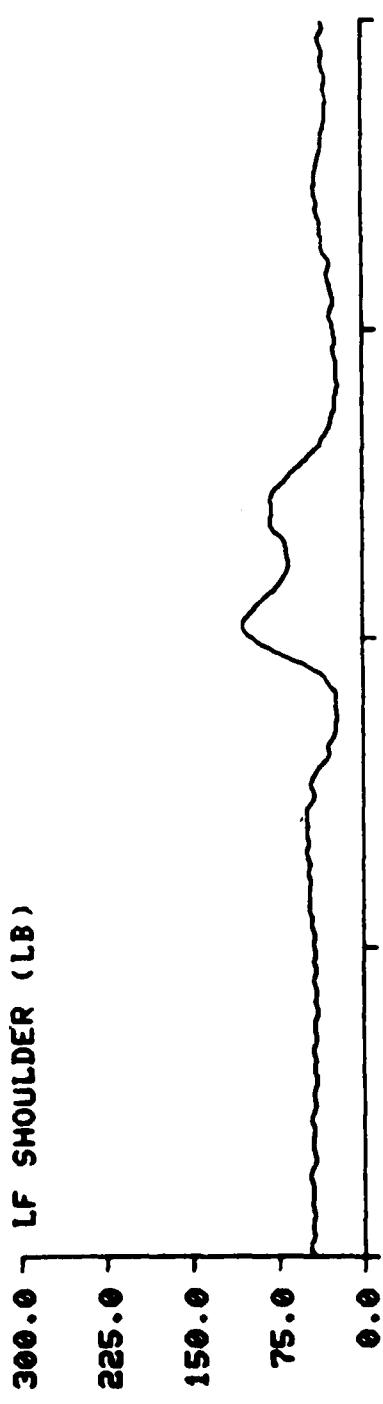
BRACING POSITIONS STUDY

TEST: 553      SUBJ: F-2

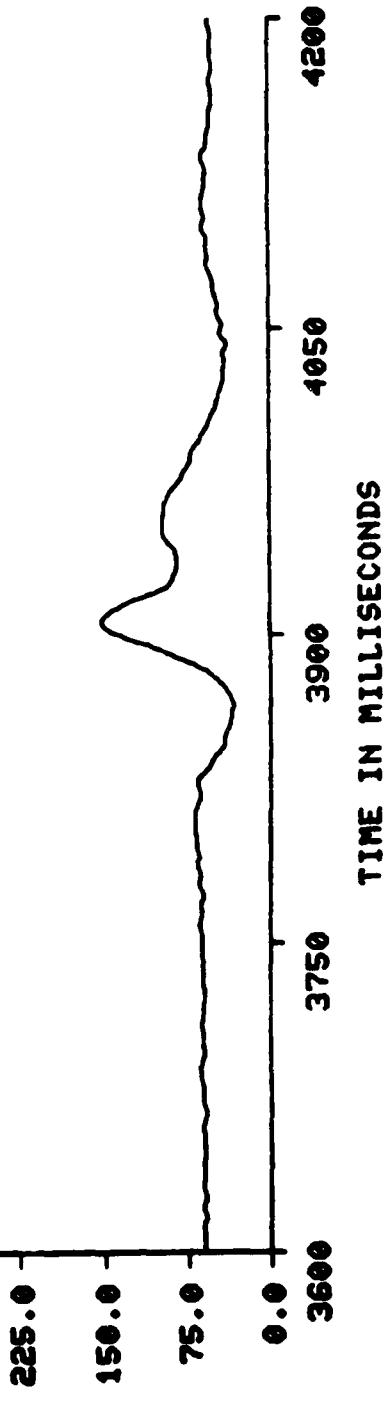


BRACING POSITIONS STUDY

TEST: 553      SUBJ: F-2

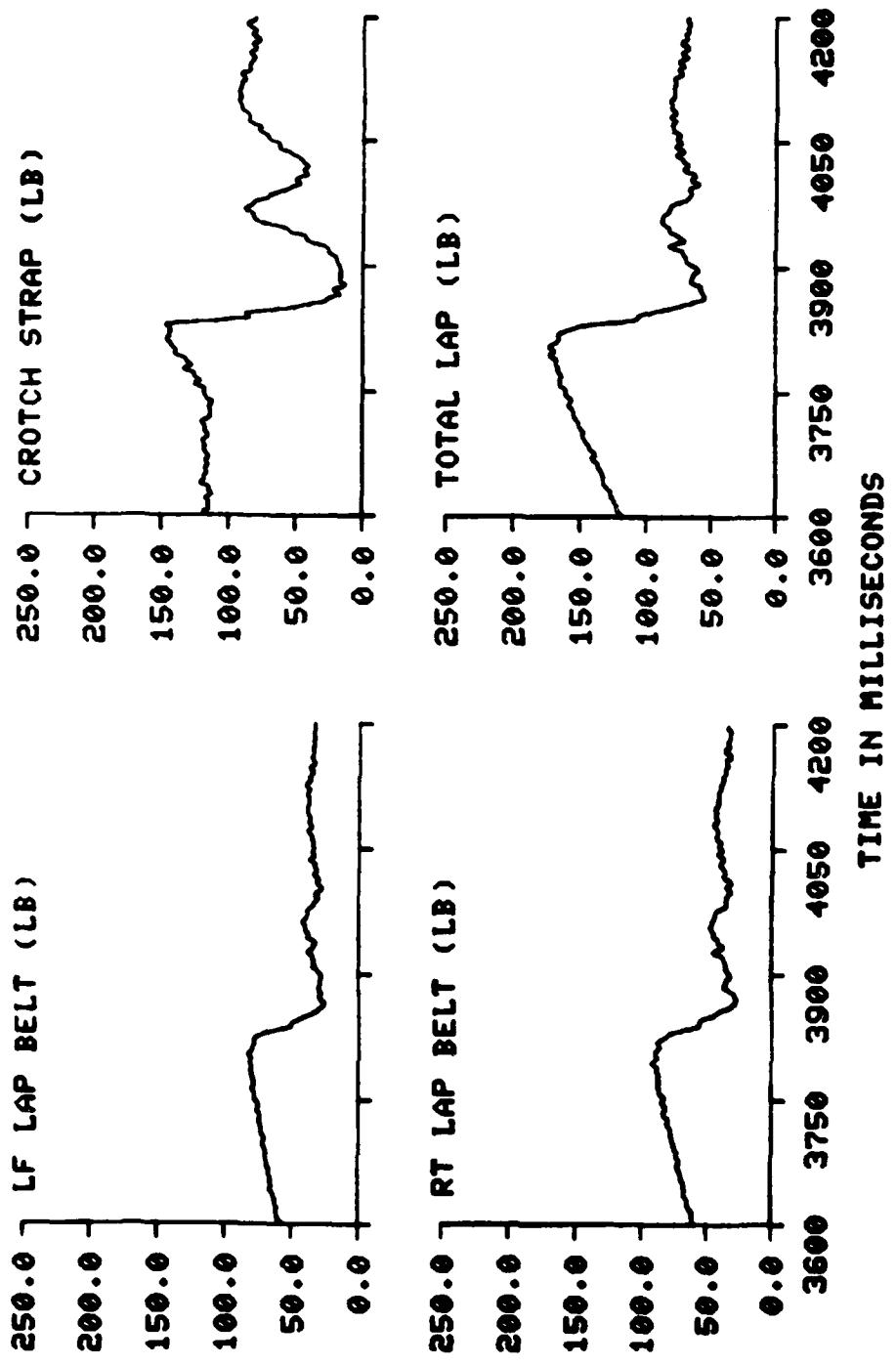


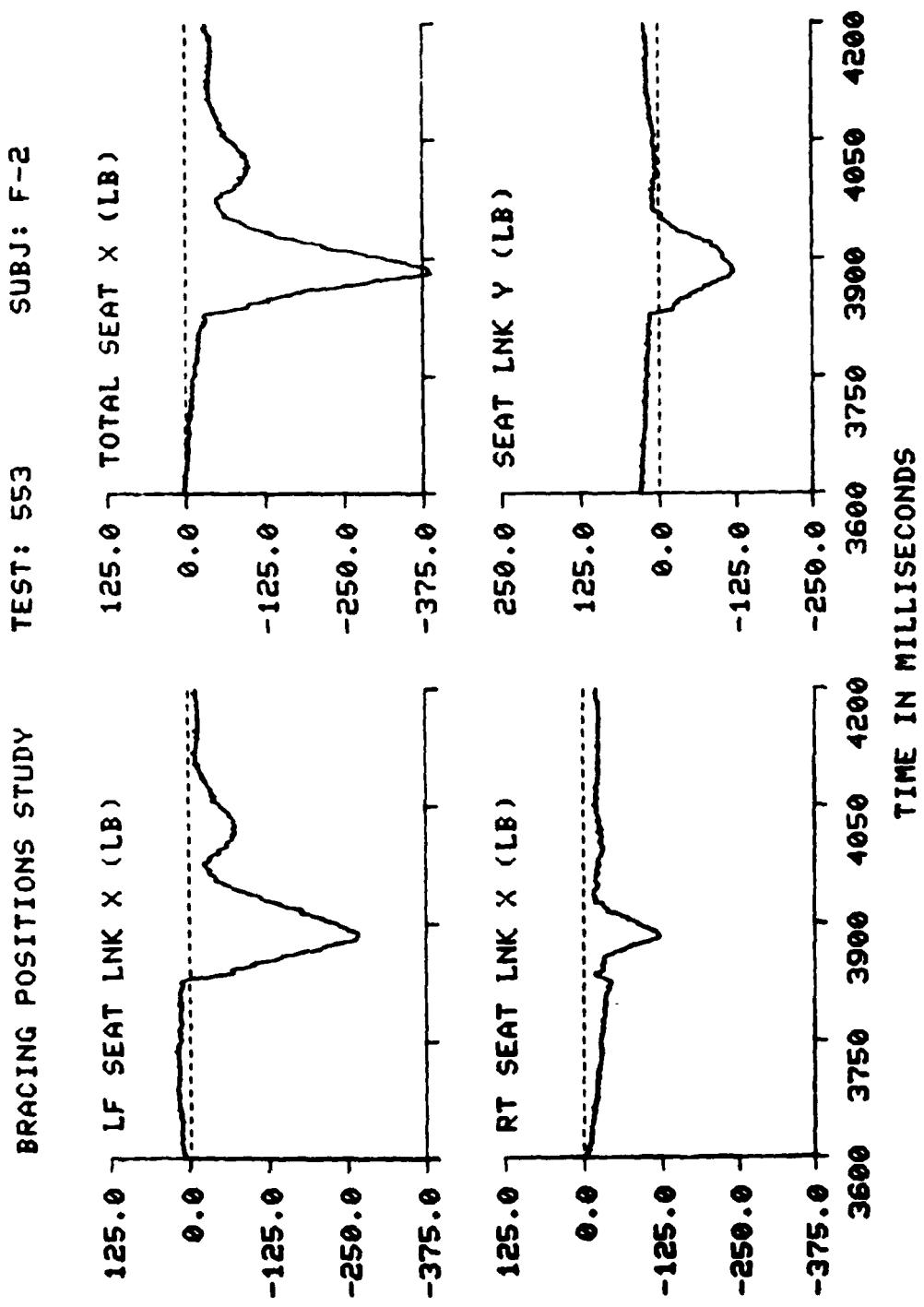
300.0 RT SHOULDER (LB)



BRACING POSITIONS STUDY

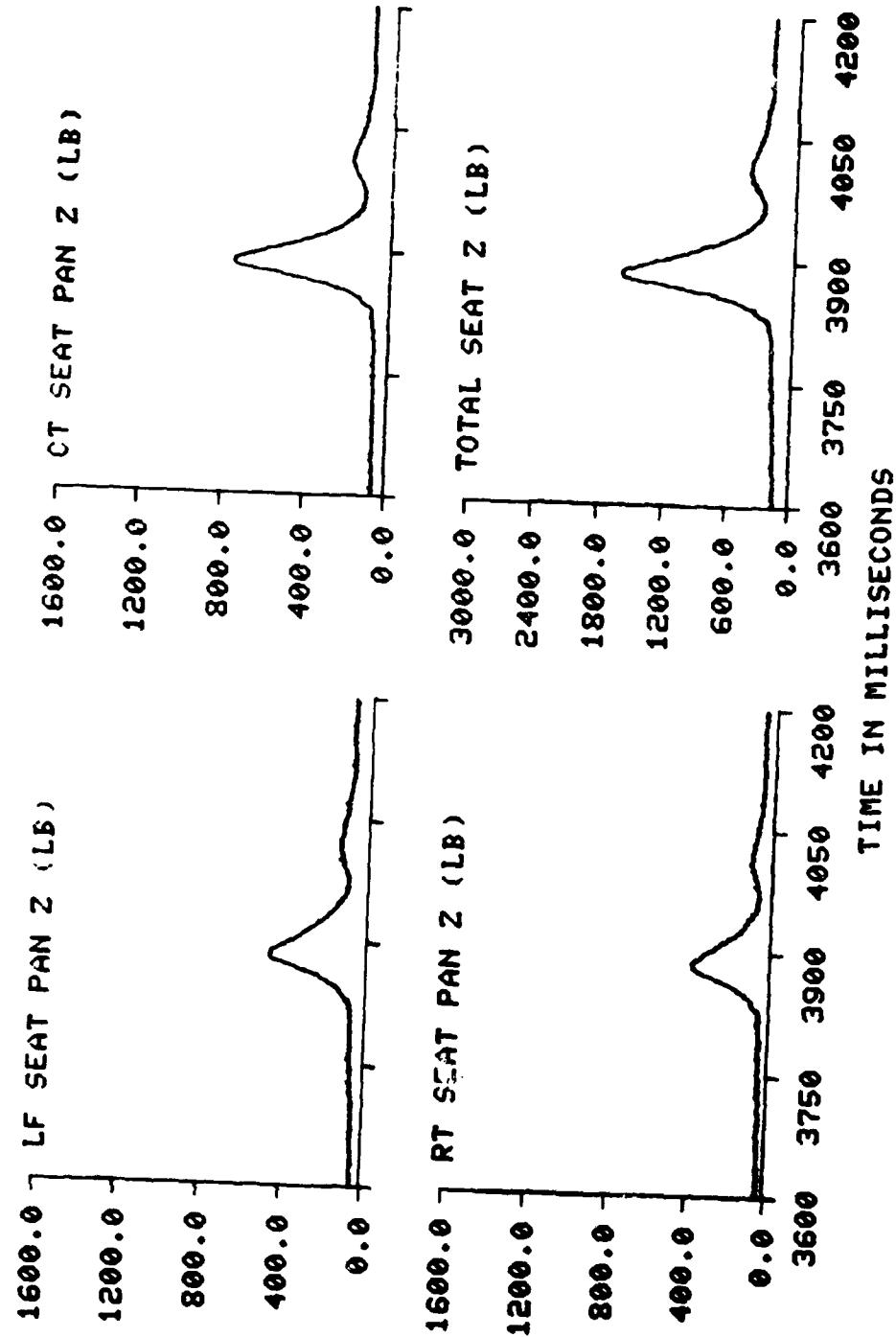
TEST: 553      SUBJ: F-2





BRACING POSITIONS STUDY

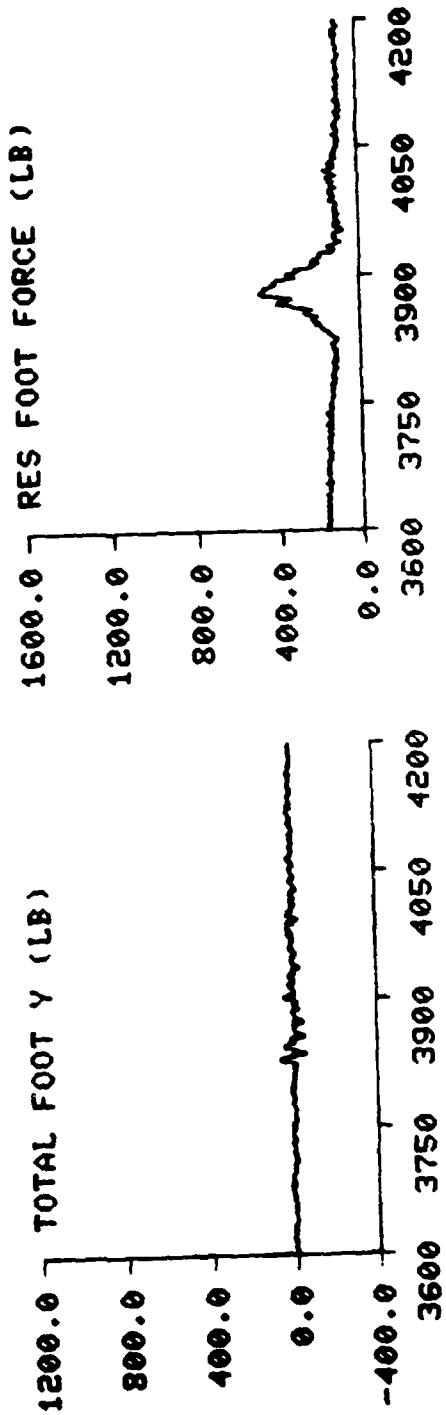
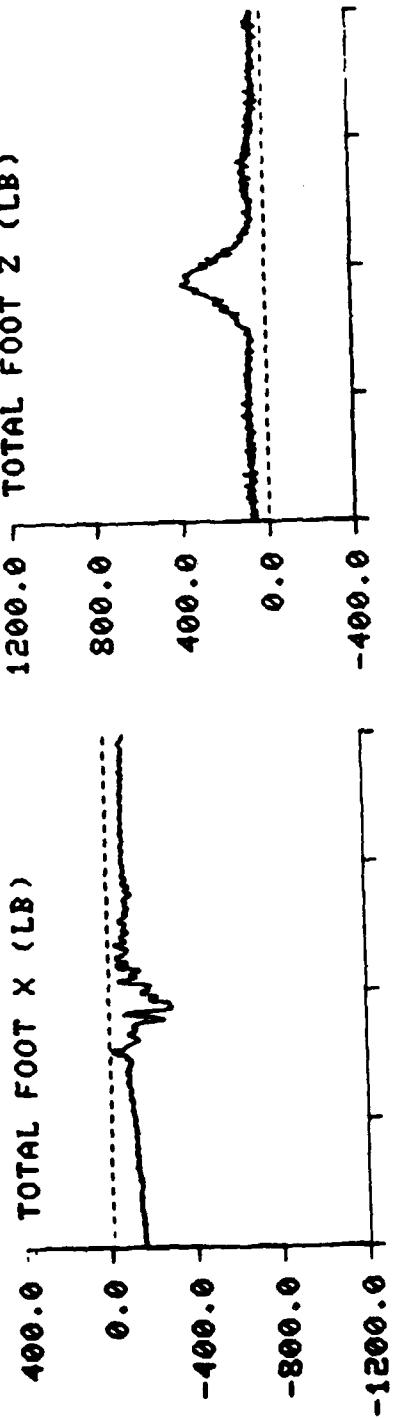
TEST: 553      SUBJ: F-2



BRACING POSITIONS STUDY

TEST: 553

SUBJ: F-2



TIME IN MILLISECONDS

BRACING POSITIONS TEST: 530 SUBJ: D-1 WT: 218.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.02	9.98	310.00	355.00	48
CARRIAGE X	1.18	-1.16	3797.00	3806.00	36
CARRIAGE Y	0.79	-0.63	3831.00	3761.00	31
CARRIAGE Z	11.49	-0.19	3807.00	3716.00	1
CARRIAGE Z (SM)	10.73	-0.09	3808.00	3713.00	
CARRIAGE VEL	-1.15	-26.17	4115.00	3771.00	29
SEAT Z *2	11.54	-0.16	3814.00	3622.00	38
FOOT PLATE Z	11.98	-0.38	3816.00	3625.00	39
SEAT X	2.54	-1.48	3769.00	3783.00	32
SEAT Y	0.73	-0.83	3783.00	3856.00	33
SEAT Z	11.54	-0.16	3814.00	3617.00	34
SEAT Z (SM)	11.10	-0.12	3815.00	3620.00	
CHEST X	4.09	-2.04	3821.00	3659.00	5
CHEST Y	0.41	-1.60	3867.00	3839.00	6
CHEST Z	17.01	-0.32	3835.00	3622.00	7
CHEST RES	17.27	0.07	3835.00	3754.00	
CHEST SI	33.61		3769.00	4202.00	
HEAD X	2.47	-2.34	3828.00	3878.00	2
HEAD Y	2.25	0.79	3879.00	3832.00	3
HEAD Z	12.30	-2.39	3825.00	3913.00	4
HEAD RES	12.57	1.16	3825.00	4006.00	
HEAD SI	17.67		3781.00	3894.00	
HEAD HIC	14.94		3797.00	3888.00	
SHD REFL LF	42.52	1.03	3899.00	3809.00	14
SHD REEL LF	26.73	3.92	3867.00	3820.00	16
LF SHOULDER	60.76	5.53	3881.00	3810.00	
SHD REFL RT	54.72	10.64	3891.00	3818.00	15
SHD REEL RT	43.08	7.78	3860.00	3826.00	17
RT SHOULDER	78.13	19.78	3876.00	3826.00	
TOTAL SHD REFL	96.05	14.47	3899.00	3811.00	
TOTAL SHD REEL	68.87	12.78	3861.00	3826.00	
TOTAL SHOULDER	137.71	31.60	3880.00	3825.00	
TOTAL SHD / WT	0.83	0.14	3880.00	3825.00	
LF LAP BELT	52.30	33.44	3906.00	3817.00	8
RT LAP BELT	66.88	38.99	3898.00	3814.00	9
TOTAL LAP	118.34	72.83	3897.00	3816.00	
TOTAL LAP / WT	0.54	0.33	3897.00	3816.00	
CROTCH STRAP	238.52	-35.67	3906.00	3828.00	10
LF SEAT LNK X	65.64	-218.96	4163.00	3826.00	18
RT SEAT LNK X	67.46	-26.61	3877.00	3825.00	
TOTAL SEAT X	78.42	-245.00	4140.00	3825.00	
SEAT LNK Y	75.41	-95.95	3898.00	3822.00	35
LF SEAT PAN Z	497.63	51.20	3823.00	3813.00	11
RT SEAT PAN Z	439.92	38.18	3828.00	4166.00	12
CT SEAT PAN Z	1253.57	135.61	3825.00	3603.00	13
TOTAL SEAT Z	2189.48	251.09	3825.00	3613.00	
TOTAL SEAT Z / WT	10.04	1.15	3825.00	3613.00	
RES SEAT FORCE	2204.83	255.88	3825.00	3813.00	
RES SEAT FORCE / WT	10.11	1.17	3825.00	3613.00	
LF FOOT X	-13.65	-212.56	3773.00	3826.00	20
RT FOOT X	8.95	-176.09	3773.00	3826.00	23
CT FOOT X	-76.78	-307.54	3773.00	3826.00	26
TOTAL FOOT X	-61.46	-896.19	3773.00	3826.00	
LF FOOT Y	172.39	-4.93	3819.00	4043.00	21
RT FOOT Y	21.16	-149.23	4034.00	3816.00	24
CT FOOT Y	9.90	-55.07	3851.00	3798.00	27
TOTAL FOOT Y	53.53	-57.61	3850.00	3782.00	
LF FOOT Z	254.00	33.09	3821.00	3772.00	22
RT FOOT Z	276.96	49.79	3825.00	4161.00	25
CT FOOT Z	119.92	-106.15	3818.00	3666.00	28
TOTAL FOOT Z	603.03	62.36	3822.00	4061.00	
RES FOOT FORCE	917.10	159.18	3826.00	3772.00	

BRACING POSITIONS TEST: 551 SUBJ: F-3 WT: 160.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
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IOV EXT PWR	10.03	9.97	229.00	169.00	48
CARRIAGE X	0.90	-0.71	3856.00	3892.00	36
CARRIAGE Y	0.75	-0.52	3903.00	3622.00	31
CARRIAGE Z	10.92	-0.27	3904.00	3677.00	1
CARRIAGE Z (SM)	10.28	-0.12	3904.00	3677.00	
CARRIAGE VEL	-1.18	-26.26	4145.00	3849.00	29
SEAT Z #2	12.65	-0.18	3904.00	3722.00	38
FOOT PLATE Z	12.85	-0.44	3906.00	3708.00	39
SEAT X	1.05	-1.25	3856.00	3865.00	32
SEAT Y	0.65	-1.24	3853.00	3866.00	33
SEAT Z	12.41	-0.24	3904.00	3724.00	34
SEAT Z (SM)	11.46	-0.10	3904.00	3723.00	
CHEST X	2.19	-2.08	3894.00	3955.00	5
CHEST Y	-0.31	-1.67	4049.00	3917.00	6
CHEST Z	14.92	-0.81	3920.00	3711.00	7
CHEST RES	15.11	0.85	3920.00	3740.00	
CHEST SI	27.78		3851.00	3989.00	
HEAD X	1.73	-2.64	3913.00	3959.00	23
HEAD Y	3.62	0.08	4028.00	3948.00	
HEAD Z	11.30	-1.47	3915.00	3719.00	4
HEAD RES	11.42	0.83	3915.00	4092.00	
HEAD SI	15.64		3873.00	3973.00	
HEAD HIC	13.16		3883.00	3954.00	
SHD REFL LF	34.24	3.14	3969.00	3910.00	14
SHD REEL LF	30.54	0.40	3954.00	3904.00	16
LF SHOULDER	55.94	4.61	3954.00	3910.00	
SHD REFL RT	31.61	6.96	3988.00	3908.00	15
SHD REEL RT	41.34	5.13	3953.00	3987.00	17
RT SHOULDER	63.12	13.58	3955.00	3910.00	
TOTAL SHLD REFL	65.21	10.41	3989.00	3909.00	
TOTAL SHLD REEL	71.87	7.29	3953.00	3912.00	
TOTAL SHOULDER	119.05	18.20	3955.00	3910.00	
TOTAL SHD / WT	0.74	0.11	3955.00	3910.00	
LF LAP BELT	52.65	17.94	3985.00	3907.00	8
RT LAP BELT	67.05	15.26	3997.00	3905.00	9
TOTAL LAP	119.00	33.61	3996.00	3906.00	
TOTAL LAP / WT	0.74	0.21	3996.00	3906.00	
CROTCH STRAP	146.95	-8.09	3999.00	3913.00	
LF SEAT LNK X	28.81	-220.08	3775.00	3915.00	10
RT SEAT LNK X	41.58	-13.15	3957.00	4024.00	18
TOTAL SEAT X	51.32	-227.69	3800.00	3915.00	19
SEAT LNK Y	58.68	-79.26	3988.00	3912.00	
LF SEAT PAN Z	392.26	28.10	3916.00	3680.00	35
RT SEAT PAN Z	262.27	14.44	3917.00	3611.00	11
CT SEAT PAN Z	747.97	64.18	3916.00	3649.00	12
TOTAL SEAT Z	1397.61	115.80	3916.00	3613.00	13
TOTAL SEAT Z / WT	8.74	0.72	3916.00	3613.00	
RES SEAT FORCE	1417.52	128.46	3916.00	3613.00	
RES SEAT FORCE / WT	8.86	0.61	3916.00	3613.00	
LF FOOT X	-77.92	-255.13	4199.00	3915.00	20
RT FOOT X	-2.24	-177.59	4127.00	3921.00	23
CT FOOT X	-128.22	-316.95	4191.00	3914.00	
TOTAL FOOT X	-229.10	-730.81	4127.00	3921.00	
LF FOOT Y	169.92	-5.64	3907.00	4111.00	21
RT FOOT Y	26.81	-174.42	4017.00	3907.00	24
CT FOOT Y	19.35	-65.20	4013.00	3904.00	27
TOTAL FOOT Y	42.79	-77.10	4014.00	3904.00	
LF FOOT Z	247.93	61.90	3909.00	4053.00	22
RT FOOT Z	275.93	55.34	3908.00	4027.00	25
CT FOOT Z	28.56	-148.41	3929.00	3847.00	
TOTAL FOOT Z	524.93	54.36	3908.00	4158.00	28
RES FOOT FORCE	670.92	243.64	3917.00	4138.00	

BRACING POSITIONS TEST: 562 SUBJ: F-2 WT: 154.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
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IOV EXT PWR	10.04	9.97	3840.00	1528.00	48
CARRIAGE X	1.42	-1.39	3822.00	3831.00	36
CARRIAGE Y	1.19	-1.17	3790.00	3784.00	31
CARRIAGE Z	11.64	-0.32	3832.00	3722.00	1
CARRIAGE Z (SM)	10.85	-0.09	3832.00	3724.00	
CARRIAGE VEL	-0.87	-26.27	4184.00	3792.00	29
SEAT Z #2	12.32	-0.22	3839.00	3665.00	38
FOOT PLATE Z	12.24	-0.31	3838.00	3635.00	39
SEAT X	1.37	-1.26	3822.00	3831.00	32
SEAT Y	1.40	-1.75	3799.00	3805.00	33
SEAT Z	12.17	-0.16	3838.00	3664.00	34
SEAT Z (SM)	11.24	-0.07	3839.00	3648.00	
CHEST X	2.93	-1.14	3853.00	3887.00	5
CHEST Y	-0.33	-2.69	3811.00	3856.00	6
CHEST Z	18.56	-0.76	3854.00	3669.00	7
CHEST RES	18.93	0.86	3854.00	3790.00	
CHEST SI	36.45		3797.00	3910.00	
HEAD X	1.27	-2.73	3842.00	3888.00	2
HEAD Y	2.59	0.39	3947.00	3857.00	3
HEAD Z	13.56	-4.72	3850.00	3950.00	4
HEAD RES	13.61	0.87	3850.00	4074.00	
HEAD SI	20.82		3805.00	3931.00	
HEAD HIC	16.43		3827.00	3879.00	
SHO REFL LF	18.02	-2.84	3938.00	3839.00	14
SHO REEL LF	6.46	-1.49	3936.00	3877.00	16
LF SHOULDER	23.61	-2.02	3937.00	3838.00	
SHO REFL RT	21.01	1.45	3936.00	3835.00	15
SHO REEL RT	11.74	-0.55	3925.00	3931.00	17
RT SHOULDER	31.77	4.78	3935.00	3833.00	
TOTAL SHLD REFL	38.56	0.34	3937.00	3838.00	
TOTAL SHLD REEL	17.18	-0.23	3935.00	3992.00	
TOTAL SHOULDER	54.84	6.48	3936.00	3837.00	
TOTAL SHD / WT	0.36	0.04	3936.00	3837.00	
LF LAP BELT	38.57	19.56	3930.00	3840.00	8
RT LAP BELT	62.10	31.42	3936.00	3837.00	9
TOTAL LAP	100.53	51.82	3930.00	3838.00	
TOTAL LAP / WT	0.65	0.34	3930.00	3838.00	
CROTCH STRAP	89.54	-1.76	3937.00	3859.00	10
LF SEAT LNK X	14.75	-279.08	3665.00	3852.00	18
RT SEAT LNK X	-0.82	-88.75	3604.00	3847.00	19
TOTAL SEAT X	8.74	-366.06	3604.00	3848.00	
SEAT LNK Y	28.96	-142.40	4151.00	3850.00	35
LF SEAT PAN Z	533.54	24.49	3848.00	3634.00	11
RT SEAT PAN Z	349.79	10.24	3849.00	3613.00	12
CT SEAT PAN Z	672.88	34.90	3851.00	3641.00	13
TOTAL SEAT Z	1540.15	88.43	3850.00	3613.00	
TOTAL SEAT Z / WT	10.00	0.57	3850.00	3613.00	
RES SEAT FORCE	1588.74	90.40	3850.00	3613.00	
RES SEAT FORCE / WT	10.32	0.59	3850.00	3613.00	
LF FOOT X	-0.34	-106.13	3797.00	3846.00	20
RT FOOT X	16.34	-140.51	3796.00	3846.00	23
CT FOOT X	-8.57	-187.45	3799.00	3847.00	26
TOTAL FOOT X	-2.39	-429.62	3797.00	3846.00	
LF FOOT Y	125.92	-23.44	3837.00	3803.00	21
RT FOOT Y	15.46	-159.36	3624.00	3839.00	24
CT FOOT Y	40.51	-21.79	3872.00	3842.00	27
TOTAL FOOT Y	75.88	-99.06	3797.00	3805.00	
LF FOOT Z	169.55	9.44	3847.00	3804.00	22
RT FOOT Z	245.41	18.43	3845.00	3797.00	25
CT FOOT Z	214.35	-54.20	3841.00	3603.00	28
TOTAL FOOT Z	545.01	66.47	3849.00	4192.00	
RES FOOT FORCE	678.20	111.91	3847.00	4196.00	

BRACING POSITIONS TEST: 554 SUBJ: F-4 WT: 151.0 G: 10 CP: 2 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.03	9.97	1153.00	3552.00	48
CARRIAGE X	0.90	-0.94	3950.00	3882.00	36
CARRIAGE Y	0.60	-0.44	3928.00	3855.00	31
CARRIAGE Z	10.88	-0.19	3923.00	3819.00	1
CARRIAGE Z (SM)	10.19	-0.07	3910.00	3820.00	
CARRIAGE VEL	-1.28	-26.30	4168.00	3868.00	29
SEAT Z #2	12.82	-0.19	3916.00	3608.00	38
FOOT PLATE Z	12.17	-0.29	3916.00	3733.00	39
SEAT X	1.34	-1.02	3962.00	3883.00	32
SEAT Y	0.48	-0.90	3901.00	3877.00	33
SEAT Z	12.74	-0.15	3916.00	3730.00	34
SEAT Z (SM)	11.49	-0.10	3916.00	3733.00	
CHEST X	2.97	-1.31	3932.00	3963.00	5
CHEST Y	0.16	-1.87	3966.00	3927.00	6
CHEST Z	16.45	-0.61	3931.00	3613.00	7
CHEST RES	16.76	0.74	3931.00	3698.00	
CHEST SI	28.16		3867.00	4111.00	
HEAD X	.91	-3.80	3868.00	3854.00	2
HEAD Y	2.09	-0.16	3997.00	4020.00	3
HEAD Z	13.60	-3.70	3936.00	4016.00	4
HEAD RES	13.62	0.54	3936.00	4135.00	
HEAD SI	19.75		3877.00	4006.00	
HEAD HIC	15.65		3898.00	3960.00	
SHD REFL LF	44.46	3.69	3975.00	3929.00	14
SHD REEL LF	26.79	2.24	4063.00	3930.00	16
LF SHOULDER	69.82	5.98	3972.00	3930.00	
SHD REFL RT	51.11	10.62	3981.00	3923.00	15
SHD REEL RT	47.32	-1.48	3967.00	3925.00	17
RT SHOULDER	69.44	9.60	3968.00	3924.00	
TOTAL SHD REFL	94.36	14.83	3976.00	3923.00	
TOTAL SHD REEL	70.35	1.42	3969.00	3924.00	
TOTAL SHOULDER	158.08	16.71	3971.00	3923.00	
TOTAL SHD / WT	1.05	0.11	3971.00	3923.00	
LF LAP BELT	42.64	9.05	4022.00	3944.00	8
RT LAP BELT	58.36	12.75	4036.00	3943.00	9
TOTAL LAP	100.40	22.06	4035.00	3943.00	
TOTAL LAP / WT	0.66	0.15	4035.00	3943.00	
CROTCH STRAP	148.78	-5.70	3986.00	3923.00	10
LF SEAT LNK X	31.33	-218.13	3697.00	3925.00	18
RT SEAT LNK X	74.18	85.06	3968.00	3927.00	19
TOTAL SEAT X	27.66	-302.58	3632.00	3925.00	
SEAT LNK Y	29.23	-129.37	3819.00	3930.00	35
LF SEAT PAN Z	478.10	56.94	3927.00	3808.00	11
RT SEAT PAN Z	449.41	27.93	3927.00	3604.00	12
CT SEAT PAN Z	722.75	50.43	3934.00	3628.00	13
TOTAL SEAT Z	1608.92	149.12	3927.00	3604.00	
TOTAL SEAT Z / WT	10.66	0.99	3927.00	3604.00	
RES SEAT FORCE	1641.12	152.02	3927.00	3604.00	
RES SEAT FORCE / WT	10.87	1.01	3927.00	3604.00	
LF FOOT X	-0.25	-138.58	3862.00	3932.00	20
RT FOOT X	26.52	-66.00	3874.00	3931.00	23
CT FOOT X	-1.36	-145.36	3875.00	3933.00	26
TOTAL FOOT X	6.85	-347.28	3874.00	3933.00	
LF FOOT Y	130.65	-1.24	3919.00	3854.00	21
RT FOOT Y	22.42	-111.59	3960.00	3914.00	24
CT FOOT Y	9.59	-72.28	4004.00	3911.00	27
TOTAL FOOT Y	35.09	-58.17	3891.00	3912.00	
LF FOOT Z	195.61	21.38	3948.00	3879.00	22
RT FOOT Z	204.94	4.67	3924.00	3867.00	25
CT FOOT Z	65.24	-71.37	3875.00	4050.00	28
TOTAL FOOT Z	364.04	35.37	3922.00	4157.00	
RES FOOT FORCE	482.78	86.34	3922.00	3833.00	

BRACING POSITIONS TEST: 533 SUBJ: G-3 WT: 166.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.03	9.98	464.00	2103.00	48
CARRIAGE X	1.31	-1.52	3851.00	3845.00	36
CARRIAGE T	1.20	-0.94	3850.00	3797.00	31
CARRIAGE Z	11.83	-0.44	3845.00	3762.00	1
CARRIAGE Z (SM)	10.83	-0.16	3855.00	3763.00	
CARRIAGE VEL	-1.09	-26.24	4155.00	3806.00	29
SEAT Z #2	12.27	-0.08	3853.00	3761.00	38
FOOT PLATE Z	12.60	-0.41	3854.00	3773.00	39
SEAT X	1.56	-1.79	3808.00	3845.00	32
SEAT Y	0.60	-0.78	3943.00	3856.00	33
SEAT Z	12.10	-0.09	3852.00	3723.00	34
SEAT Z (SM)	11.20	-0.06	3853.00	3724.00	
CHEST X	2.76	-2.16	3863.00	3911.00	5
CHEST Y	-1.00	-3.29	3914.00	3865.00	6
CHEST Z	14.52	-1.32	3868.00	3797.00	7
CHEST RES	14.97	1.26	3868.00	3802.00	
CHEST SI	26.06		3807.00	3919.00	
HEAD X	0.40	-4.68	3659.00	3909.00	2
HEAD Y	1.89	1.04	3918.00	3891.00	3
HEAD Z	12.06	-1.30	3863.00	3738.00	4
HEAD RES	12.17	1.30	3863.00	4191.00	
HEAD SI	18.19		3815.00	4076.00	
HEAD MIC	12.42		3829.00	3924.00	
SHD REFL LF	51.53	6.87	3908.00	3850.00	14
SHD REEL LF	69.52	5.57	3895.00	3855.00	16
LF SHOULDER	18.71	13.92	3895.00	3852.00	
SHD REFL RT	22.56	3.40	3951.00	3850.00	15
SHD REEL RT	52.74	-0.16	3910.00	3958.00	17
RT SHOULDER	46.16	5.35	3909.00	3850.00	
TOTAL SHLD REFL	65.71	10.27	3808.00	3850.00	
TOTAL SHLD REEL	89.96	8.44	3898.00	3983.00	
TOTAL SHOULDER	151.98	19.52	3898.00	3851.00	
TOTAL SHD / WT	0.92	0.12	3898.00	3851.00	
LF LAP BELT	47.22	18.85	3934.00	3856.00	8
RT LAP BELT	53.91	24.26	3914.00	3853.00	9
TOTAL LAP	100.22	43.99	3943.00	3854.00	
TOTAL LAP / WT	0.60	0.26	3943.00	3854.00	
CROTCH STRAP	84.32	9.62	4094.00	3857.00	10
LF SEAT LNK X	36.64	-181.13	3785.00	3863.00	18
RT SEAT LNK X	47.60	-112.88	3914.00	3861.00	19
TOTAL SEAT X	31.56	-293.40	3630.00	3863.00	
SEAT LNK Y	29.99	-66.02	3767.00	3858.00	35
LF SEAT PAN Z	395.65	50.04	3861.00	3612.00	11
RT SEAT PAN Z	616.52	48.72	3866.00	3626.00	12
CT SEAT PAN Z	735.38	66.95	3865.00	3613.00	13
TOTAL SEAT Z	1741.48	167.99	3863.00	3610.00	
TOTAL SEAT Z / WT	10.49	1.01	3863.00	3610.00	
RES SEAT FORCE	1767.06	172.04	3863.00	3610.00	
RES SEAT FORCE / WT	10.64	1.04	3863.00	3610.00	
LF FOOT X	-0.52	-152.42	3810.00	3868.00	20
RT FOOT X	25.66	-99.47	3807.00	3868.00	23
CT FOOT X	3.40	-220.21	3810.00	3869.00	26
TOTAL FOOT X	17.08	-468.51	3810.00	3868.00	
LF FOOT Y	118.60	-10.57	3848.00	3819.00	21
RT FOOT Y	23.22	-117.00	3810.00	3876.00	24
CT FOOT Y	20.18	-43.00	3813.00	3850.00	27
TOTAL FOOT Y	57.09	-57.14	3811.00	3817.00	
LF FOOT Z	181.13	15.82	3860.00	3917.00	22
RT FOOT Z	191.25	-1.18	3868.00	3810.00	25
CT FOOT Z	138.74	-54.17	3856.00	3802.00	28
TOTAL FOOT Z	431.40	44.83	3870.00	3674.00	
RES FOOT FORCE	635.96	86.33	3869.00	3947.00	

BRACING POSITIONS TEST: 555 SUBJ: H-3 WT: 188.0 G: 10 GP: 2 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.03	9.98	105.00	229.00	48
CARRIAGE X	1.28	-0.97	3820.00	3883.00	36
CARRIAGE Y	0.87	-0.85	3812.00	3984.00	31
CARRIAGE Z	10.73	-0.20	3857.00	3637.00	1
CARRIAGE Z (SM)	10.16	-0.07	3857.00	3636.00	
CARRIAGE VEL	-1.14	-26.34	4128.00	3814.00	29
SEAT Z *2	12.21	-0.20	3864.00	3673.00	38
FOOT PLATE Z	19.09	-0.51	3866.00	3663.00	39
SEAT X	1.87	-1.15	3818.00	3882.00	32
SEAT Y	1.11	-1.07	3885.00	3839.00	33
SEAT Z	12.14	-0.15	3863.00	3679.00	34
SEAT Z (SM)	11.34	-0.10	3864.00	3679.00	
CHEST X	9.63	-1.69	3876.00	3931.00	5
CHEST Y	-0.37	-3.44	3926.00	3869.00	6
CHEST Z	14.06	-0.75	3879.00	3685.00	7
CHEST RES	14.57	0.93	3879.00	4148.00	
CHEST SI	27.71		3819.00	3945.00	
HEAD X	0.55	-3.52	3816.00	3924.00	2
HEAD Y	1.72	0.05	3873.00	3932.00	3
HEAD Z	11.28	-1.29	3874.00	3683.00	4
HEAD RES	11.43	0.66	3874.00	4172.00	
HEAD SI	16.27		3825.00	3962.00	
HEAD MIC	13.30		3847.00	3910.00	
SHD REFL LF	34.74	-1.84	3958.00	3868.00	14
SHD REEL LF	45.11	2.52	3820.00	3871.00	16
LF SHOULDER	68.05	1.12	3929.00	3869.00	
SHD REFL RT	34.97	5.29	3949.00	3869.00	15
SHD REEL RT	53.64	4.51	3934.00	3860.00	
RT SHOULDER	63.78	9.99	3935.00	3859.00	17
TOTAL SHLD REFL	68.98	3.52	3957.00	3868.00	
TOTAL SHLD REEL	90.43	8.07	3932.00	3858.00	
TOTAL SHOULDER	147.84	14.26	3934.00	3868.00	
TOTAL SHD / WT	0.79	0.08	3934.00	3866.00	
LF LAP BELT	51.82	22.09	3949.00	3866.00	8
RT LAP BELT	62.42	23.72	3941.00	3863.00	9
TOTAL LAP	112.54	46.68	4092.00	3864.00	
TOTAL LAP / WT	0.60	0.25	4092.00	3864.00	
CROTCH STRAP	156.56	-22.84	4083.00	3881.00	10
LF SEAT LNK X	40.89	-211.45	4108.00	3874.00	16
RT SEAT LNK X	39.35	-51.03	3923.00	3877.00	18
TOTAL SEAT X	38.90	-261.26	3951.00	3874.00	
SEAT LNK Y	60.35	-55.10	4090.00	3871.00	35
LF SEAT PAN Z	405.14	33.19	3874.00	3806.00	11
RT SEAT PAN Z	442.73	28.93	3875.00	3638.00	12
CT SEAT PAN Z	879.97	76.14	3877.00	3628.00	13
TOTAL SEAT Z	1714.64	151.40	3875.00	3608.00	
TOTAL SEAT Z / WT	9.12	0.81	3875.00	3608.00	
RES SEAT FORCE	1735.11	156.84	3875.00	3808.00	
RES SEAT FORCE / WT	9.23	0.83	3875.00	3608.00	
LF FOOT X	-6.58	-164.80	3820.00	3880.00	20
RT FOOT X	-0.09	-139.31	3820.00	3880.00	23
CT FOOT X	-42.29	-262.31	3821.00	3881.00	26
TOTAL FOOT X	-53.43	-564.62	3821.00	3881.00	
LF FOOT Y	136.73	-11.76	3867.00	4099.00	21
RT FOOT Y	35.92	-129.14	3988.00	3865.00	24
CT FOOT Y	15.11	-67.65	3984.00	3878.00	27
TOTAL FOOT Y	51.22	-69.29	3840.00	3864.00	
LF FOOT Z	205.33	28.01	3881.00	3995.00	22
RT FOOT Z	210.97	34.46	3878.00	3969.00	25
CT FOOT Z	-68.79	-364.98	3874.00	3812.00	28
TOTAL FOOT Z	261.43	-247.88	3870.00	3748.00	
RES FOOT FORCE	621.61	158.53	3881.00	3821.00	

BRACING POSITIONS TEST: 556 SUBJ: H-5 WT: 136.0 G: 10 GP: 2 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.03	9.97	317.00	1598.00	48
CARRIAGE X	1.17	-1.03	3838.00	3873.00	36
CARRIAGE Y	0.69	-0.50	3830.00	3948.00	31
CARRIAGE Z	11.67	-0.20	3874.00	3714.00	1
CARRIAGE Z (SM)	10.68	-0.05	3875.00	3618.00	
CARRIAGE VEL	-1.08	-26.19	4152.00	3834.00	29
SEAT Z #2	11.76	-0.20	3880.00	3705.00	38
FOOT PLATE Z	11.87	-0.37	3881.00	3689.00	39
SEAT X	1.35	-1.20	3837.00	3845.00	32
SEAT Y	1.31	-1.62	3835.00	3842.00	33
SEAT Z	11.79	-0.18	3880.00	3705.00	34
SEAT Z (SM)	11.08	-0.07	3881.00	3703.00	
CHEST X	0.68	-1.72	3847.00	3935.00	5
CHEST Y	-0.44	-2.66	3850.00	3903.00	6
CHEST Z	17.20	-1.27	3901.00	3764.00	7
CHEST RES	17.46	0.53	3901.00	3850.00	
CHEST SI	25.97		3839.00	3965.00	
HEAD X	4.46	-3.96	3695.00	3919.00	2
HEAD Y	2.75	0.21	4014.00	4043.00	3
HEAD Z	12.14	-1.17	3893.00	3636.00	4
HEAD RES	12.28	0.75	3893.00	4128.00	
HEAD SI	17.34		3845.00	3969.00	
HEAD HIC	14.05		3866.00	3829.00	
SHO REFL LF	38.05	-1.76	3968.00	3891.00	14
SHO REEL LF	27.71	3.46	4063.00	3816.00	16
LF SHOULDER	53.17	3.05	3968.00	3890.00	
SHD REFL RT	40.18	8.77	4075.00	3880.00	15
SHD REEL RT	45.28	5.91	3937.00	3892.00	17
RT SHOULDER	78.80	14.94	3939.00	3892.00	
TOTAL SHLD REFL	73.27	7.28	3967.00	3891.00	
TOTAL SHLD REEL	58.73	11.03	3937.00	3891.00	
TOTAL SHOULDER	119.75	18.31	3943.00	3891.00	
TOTAL SHD / WT	0.66	0.13	3943.00	3891.00	
LF LAP BELT	37.83	6.07	3969.00	3905.00	8
RT LAP BELT	45.80	10.13	3964.00	3889.00	9
TOTAL LAP	83.55	18.23	3964.00	3889.00	
TOTAL LAP / WT	0.61	0.13	3964.00	3889.00	
CROTCH STRAP	108.07	21.20	3971.00	3888.00	10
LF SEAT LNK X	58.57	-151.14	4128.00	3888.00	18
RT SEAT LNK X	93.51	1.28	3930.00	3831.00	19
TOTAL SEAT X	69.80	-142.48	3950.00	3888.00	
SEAT LNK Y	75.06	-27.64	3955.00	3880.00	35
LF SEAT PAN Z	287.65	27.88	3669.00	3629.00	11
RT SEAT PAN Z	298.05	18.87	3890.00	3632.00	12
CT SEAT PAN Z	815.14	78.41	3894.00	3606.00	13
TOTAL SEAT Z	1379.62	137.49	3889.00	3627.00	
TOTAL SEAT Z / WT	10.14	1.01	3889.00	3627.00	
RES SEAT FORCE	1387.04	148.02	3689.00	3632.00	
RES SEAT FORCE / WT	10.20	1.09	3889.00	3632.00	
LF FOOT X	-23.24	-214.01	3839.00	3891.00	20
RT FOOT X	13.90	-116.51	3838.00	3892.00	23
CT FOOT X	-98.05	-248.24	3839.00	3890.00	26
TOTAL FOOT X	-48.28	-572.44	3839.00	3893.00	
LF FOOT Y	135.00	-9.12	3882.00	4169.00	21
RT FOOT Y	26.80	-109.86	4123.00	3881.00	24
CT FOOT Y	-3.81	-67.89	3835.00	3885.00	27
TOTAL FOOT Y	42.69	-52.79	3859.00	3895.00	
LF FOOT Z	208.60	31.58	3901.00	4171.00	22
RT FOOT Z	216.34	20.67	3892.00	4146.00	25
CT FOOT Z	84.99	-83.07	3884.00	3698.00	28
TOTAL FOOT Z	447.68	32.76	3890.00	4146.00	
RES FOOT FORCE	719.45	122.80	3890.00	3838.00	

BRACING POSITIONS TEST: 545 SUBJ: H-4 WT: 191.0 G: 10 GP: 2 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
IQV EXT PHR	10.03	9.98	82.00	2623.00	48
CARRIAGE X	1.41	-0.89	3851.00	3937.00	36
CARRIAGE Y	0.90	-0.85	3893.00	3888.00	31
CARRIAGE Z	11.26	-0.18	3886.00	3617.00	1
CARRIAGE Z (SM)	10.31	-0.09	3887.00	3616.00	
CARRIAGE VEL	-1.30	-26.20	4141.00	3854.00	29
SEAT Z #2	11.86	-0.13	3892.00	3640.00	38
FOOT PLATE Z	11.76	-0.32	3896.00	3881.00	38
SEAT X	3.70	-1.60	3850.00	3861.00	32
SEAT Y	0.91	-0.80	3849.00	3892.00	33
SEAT Z	11.54	-0.17	3892.00	3712.00	34
SEAT Z (SM)	11.01	-0.14	3893.00	3714.00	
CHEST X	1.84	-2.07	3996.00	3946.00	5
CHEST Y	-0.01	-2.26	3933.00	3889.00	6
CHEST Z	15.10	-1.00	3906.00	3640.00	7
CHEST RES	15.31	0.99	3907.00	3842.00	
CHEST SI	25.79		3851.00	3970.00	
HEAD X	2.29	-1.62	3905.00	3941.00	
HEAD Y	2.25	-0.81	3969.00	3916.00	
HEAD Z	13.09	-1.20	3911.00	3636.00	
HEAD RES	13.36	0.53	3913.00	4093.00	
HEAD SI	20.30		3857.00	3984.00	
HEAD MIC	18.71		3880.00	3941.00	
SHD REFL LF	49.76	-0.83	3976.00	3891.00	
SHD REEL LF	37.21	0.83	4027.00	3893.00	16
LF SHOULDER	81.59	0.26	3959.00	3892.00	
SHD REFL RT	39.44	2.08	4098.00	3897.00	15
SHD REEL RT	41.36	5.39	3980.00	3947.00	17
RT SHOULDER	72.70	11.55	3984.00	3890.00	
TOTAL SHD REFL	78.08	2.56	3978.00	3892.00	
TOTAL SHD REEL	59.55	9.12	3979.00	3890.00	
TOTAL SHOULDER	137.48	11.31	3978.00	3891.00	
TOTAL SHD / WT	0.72	0.06	3978.00	3891.00	
LF LAP BELT	40.40	24.32	3945.00	3906.00	8
RT LAP BELT	52.56	27.40	3944.00	3892.00	9
TOTAL LAP	92.88	54.37	3944.00	3894.00	
TOTAL LAP / WT	0.49	0.28	3944.00	3894.00	
CROTCH STRAP	236.02	-54.57	3991.00	3907.00	10
LF SEAT LNK X	35.22	-200.99	3849.00	3906.00	16
RT SEAT LNK X	42.46	-73.13	3948.00	3903.00	10
TOTAL SEAT X	27.54	-272.89	3850.00	3906.00	
SEAT LNK Y	59.65	-78.90	3826.00	3906.00	35
LF SEAT PAN Z	479.92	56.28	3903.00	4125.00	11
RT SEAT PAN Z	665.05	99.59	3906.00	3606.00	12
CT SEAT PAN Z	735.44	89.56	3908.00	4151.00	13
TOTAL SEAT Z	1871.94	267.10	3906.00	4130.00	
TOTAL SEAT Z / WT	9.80	1.40	3906.00	4130.00	
RES SEAT FORCE	1893.37	269.14	3908.00	4130.00	
RES SEAT FORCE / WT	9.91	1.41	3906.00	4130.00	
LF FOOT X	-51.50	-246.79	3851.00	3907.00	20
RT FOOT X	-0.55	-176.54	3972.00	3910.00	23
CT FOOT X	-65.76	-290.58	3993.00	3907.00	26
TOTAL FOOT X	-184.79	-708.84	3972.00	3906.00	
LF FOOT Y	181.79	-5.01	3895.00	3971.00	21
RT FOOT Y	23.66	-156.49	3851.00	3898.00	24
CT FOOT Y	12.92	-77.85	3854.00	3903.00	27
TOTAL FOOT Y	73.99	-65.33	3871.00	3900.00	
LF FOOT Z	293.43	59.66	3883.00	3980.00	22
RT FOOT Z	288.10	54.38	3907.00	4017.00	25
CT FOOT Z	143.18	-71.28	3889.00	3865.00	28
TOTAL FOOT Z	566.40	103.55	3900.00	3981.00	
RES FOOT FORCE	892.57	211.38	3907.00	3981.00	

BRACING POSITIONS TEST: 535 SUBJ: K-1 WT: 182.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
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IOV EXT PWR	10.03	9.98	579.00	592.00	48
CARRIAGE X	1.36	-1.12	3812.00	3847.00	36
CARRIAGE Y	0.84	-0.50	3854.00	3797.00	31
CARRIAGE Z	11.33	-0.20	3849.00	3765.00	1
CARRIAGE Z (SM)	10.62	-0.05	3848.00	3767.00	
CARRIAGE VEL	-1.10	-26.12	4138.00	3809.00	29
SEAT Z *2	12.39	-0.12	3855.00	3675.00	38
FOOT PLATE Z	11.99	-0.37	3857.00	3679.00	39
SEAT X	1.46	-1.27	3812.00	3847.00	32
SEAT Y	0.85	-0.98	3810.00	3878.00	33
SEAT Z	12.20	-0.11	3855.00	3674.00	34
SEAT Z (SM)	11.24	-0.06	3855.00	3676.00	
CHEST X	4.06	-1.50	3868.00	3912.00	5
CHEST Y	-0.16	-1.31	3868.00	3783.00	6
CHEST Z	14.57	-0.74	3876.00	3636.00	7
CHEST RES	14.96	0.71	3876.00	3804.00	
CHEST SI	26.80		3811.00	3925.00	
HEAD X	0.36	-2.60	3808.00	3904.00	
HEAD Y	2.49	0.80	3832.00	3867.00	
HEAD Z	12.47	-1.62	3869.00	3761.00	
HEAD RES	12.50	1.75	3869.00	3815.00	
HEAD SI	16.08		3829.00	3939.00	
HEAD MIC	12.68		3840.00	3899.00	
SHD REFL LF	32.13	2.38	3911.00	3854.00	
SHD REEL LF	30.85	4.42	3907.00	3870.00	14
LF SHOULDER	62.66	9.25	3908.00	3854.00	16
SHD REFL RT	26.96	5.34	3953.00	3860.00	
SHD REEL RT	25.90	1.26	3912.00	3970.00	15
RT SHOULDER	42.69	9.09	3939.00	3857.00	
TOTAL SHD REFL	54.37	9.33	3931.00	3856.00	
TOTAL SHD REEL	55.44	7.52	3908.00	3970.00	
TOTAL SHOULDER					
TOTAL SHD / WT	104.32	18.80	3908.00	3855.00	
LF LAP BELT	0.57	0.10	3908.00	3855.00	
RT LAP BELT	53.28	31.67	3908.00	4013.00	8
TOTAL LAP	69.22	37.51	3921.00	4022.00	9
TOTAL LAP / WT	121.28	69.72	3921.00	4025.00	
CROTCH STRAP	0.67	0.38	3921.00	4025.00	
LF SEAT LNK X	121.74	-61.93	3955.00	3872.00	
RT SEAT LNK X	34.65	-207.90	3608.00	3867.00	10
TOTAL SEAT X	22.69	-72.62	3917.00	3867.00	18
SEAT LNK Y	24.79	-280.52	3602.00	3867.00	19
LF SEAT PAN Z	29.46	-143.73	3625.00	3866.00	
RT SEAT PAN Z	647.84	73.05	3868.00	4111.00	11
CT SEAT PAN Z	672.07	69.25	3868.00	3620.00	12
TOTAL SEAT Z	703.01	56.11	3869.00	3616.00	13
TOTAL SEAT Z / WT	2020.40	217.49	3868.00	3602.00	
RES SEAT FORCE	11.10	1.19	3868.00	3602.00	
RES SEAT FORCE / WT	2044.98	220.71	3868.00	3602.00	
LF FOOT X	11.23	1.21	3868.00	3602.00	
RT FOOT X	-3.65	-147.41	3812.00	3871.00	20
CT FOOT X	23.25	-57.82	3810.00	3872.00	23
TOTAL FOOT X	4.26	-203.25	3812.00	3873.00	26
LF FOOT Y	7.11	-403.99	3812.00	3872.00	
RT FOOT Y	122.93	-6.34	3854.00	4022.00	
CT FOOT Y	24.88	-94.03	3812.00	3856.00	21
TOTAL FOOT Y	15.43	-75.34	3816.00	3855.00	24
LF FOOT Z	50.43	-46.04	3833.00	3863.00	
RT FOOT Z	146.87	10.93	3862.00	4193.00	27
CT FOOT Z	157.88	3.22	3865.00	3810.00	22
TOTAL FOOT Z	151.13	-35.74	3858.00	3971.00	25
RES FOOT FORCE	399.92	22.39	3859.00	4119.00	28
	548.16	67.60	3863.00	4183.00	

BRACING POSITIONS TEST: 549 SUBJ: M-2 WT: 167.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.03	9.98	3406.00	214.00	48
CARRIAGE X	1.53	-1.51	3804.00	3843.00	36
CARRIAGE Y	1.21	-1.01	3800.00	3795.00	31
CARRIAGE Z	12.15	-0.44	3843.00	3805.00	1
CARRIAGE Z (SM)	10.91	-0.06	3843.00	3748.00	
CARRIAGE VEL	-1.06	-26.30	4163.00	3806.00	29
SEAT Z #2	12.05	-0.15	3850.00	3656.00	38
FOOT PLATE Z	12.53	-0.51	3852.00	3658.00	39
SEAT X	2.36	-1.76	3808.00	3842.00	32
SEAT Y	0.92	-1.01	3807.00	3812.00	33
SEAT Z	11.85	-0.18	3850.00	3657.00	34
SEAT Z (SM)	11.12	-0.12	3851.00	3658.00	
CHEST X	1.18	-3.58	3816.00	3902.00	5
CHEST Y	-0.79	-2.29	3859.00	3847.00	6
CHEST Z	16.04	-0.75	3871.00	3663.00	7
CHEST RES	16.21	1.50	3871.00	3800.00	
CHEST SI	31.65		3807.00	3916.00	
HEAD X	3.55	-4.22	3858.00	3912.00	2
HEAD Y	1.20	-0.86	3936.00	3867.00	3
HEAD Z	11.00	-1.13	3863.00	3692.00	
HEAD RES	11.47	0.84	3863.00	4193.00	
HEAD SI	15.50		3815.00	4031.00	
HEAD MIC	11.45		3831.00	3918.00	
SHD REFL LF	35.05	2.58	3934.00	3844.00	14
SHD REEL LF	48.10	0.91	3902.00	3847.00	16
LF SHOULDER	78.26	3.86	3901.00	3845.00	
SHD REFL RT	24.40	7.00	3892.00	3843.00	15
SHD REEL RT	52.21	5.72	3898.00	3854.00	17
RT SHOULDER	75.43	13.92	3897.00	3845.00	
TOTAL SHD REFL	56.08	9.63	3943.00	3844.00	
TOTAL SHD REEL	98.28	7.79	3899.00	3846.00	
TOTAL SHOULDER	151.67	17.78	3899.00	3845.00	
TOTAL SHD / WT	0.91	0.11	3899.00	3845.00	
LF LAP BELT	46.18	20.82	4094.00	3851.00	8
RT LAP BELT	75.40	30.09	3935.00	3850.00	9
TOTAL LAP	119.55	51.00	3935.00	3851.00	
TOTAL LAP / WT	0.72	0.31	3935.00	3851.00	
CROTCH STRAP	65.13	-36.56	3939.00	3870.00	10
LF SEAT LNK X	42.21	-184.79	3749.00	3861.00	18
RT SEAT LNK X	32.75	-69.32	3809.00	3861.00	19
TOTAL SEAT X	34.22	-254.11	3733.00	3861.00	
SEAT LNK Y	63.21	-64.40	3937.00	3856.00	35
LF SEAT PAN Z	407.95	53.71	3860.00	3608.00	11
RT SEAT PAN Z	390.52	35.02	3862.00	4181.00	12
CT SEAT PAN Z	881.45	78.96	3862.00	3603.00	13
TOTAL SEAT Z	1671.43	186.73	3862.00	3602.00	
TOTAL SEAT Z / WT	10.01	1.12	3862.00	3602.00	
RES SEAT FORCE	1691.12	189.27	3862.00	3602.00	
RES SEAT FORCE / WT	10.13	1.13	3862.00	3602.00	
LF FOOT X	6.20	-118.57	3807.00	3859.00	20
RT FOOT X	15.02	-134.78	3807.00	3865.00	23
CT FOOT X	-26.87	-218.27	3808.00	3860.00	26
TOTAL FOOT X	-11.91	-468.06	3807.00	3859.00	
LF FOOT Y	117.39	-11.88	3844.00	3651.00	21
RT FOOT Y	15.57	-162.81	4149.00	3852.00	24
CT FOOT Y	34.64	-19.65	3802.00	3928.00	27
TOTAL FOOT Y	49.33	-74.59	3808.00	3815.00	
LF FOOT Z	201.25	20.47	3858.00	3629.00	22
RT FOOT Z	186.43	20.18	3874.00	4198.00	25
CT FOOT Z	181.09	-42.97	3853.00	3948.00	28
TOTAL FOOT Z	475.97	39.98	3858.00	4117.00	
RES FOOT FORCE	667.28	94.21	3858.00	4198.00	

BRACING POSITIONS TEST: 538 SUBJ: M10 WT: 147.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.03	9.98	293.00	341.00	48
CARRIAGE X	1.07	-1.02	3822.00	3861.00	36
CARRIAGE Y	1.01	-0.80	3867.00	3813.00	31
CARRIAGE Z	10.66	-0.18	3864.00	3770.00	1
CARRIAGE Z (SM)	10.37	-0.05	3864.00	3624.00	
CARRIAGE VEL	-1.06	-26.27	4200.00	3826.00	29
SEAT Z =2	12.77	-0.15	3870.00	3671.00	38
FOOT PLATE Z	12.34	-0.49	3871.00	3676.00	39
SEAT X	3.02	-1.06	3825.00	3887.00	32
SEAT Y	0.50	-0.71	3909.00	3893.00	33
SEAT Z	12.52	-0.15	3870.00	3682.00	34
SEAT Z (SM)	11.30	-0.10	3870.00	3682.00	
CHEST X	2.60	-2.07	3886.00	3911.00	5
CHEST Y	0.06	-1.91	3853.00	3881.00	6
CHEST Z	17.49	-0.75	3880.00	3651.00	7
CHEST RES	17.68	0.70	3880.00	3812.00	
CHEST SI	33.13		3825.00	4066.00	
HEAD X	1.44	-2.33	3872.00	3923.00	2
HEAD Y	2.72	-0.99	3872.00	3998.00	34
HEAD Z	12.72	-4.15	3877.00	3998.00	
HEAD RES	12.93	1.52	3877.00	3829.00	
HEAD SI	18.74		3833.00	3962.00	
HEAD HIC	14.48		3852.00	3909.00	
SHD REFL LF	18.71	1.96	4070.00	3864.00	14
SHD REEL LF	8.66	0.28	3915.00	3995.00	16
LF SHOULDER	23.68	5.90	3951.00	3864.00	
SHD REFL RT	20.40	5.02	3965.00	3864.00	15
SHD REEL RT	18.48	0.15	3928.00	3982.00	17
RT SHOULDER	32.99	11.21	3941.00	3864.00	
TOTAL SHD REFL	37.74	6.98	3946.00	3864.00	
TOTAL SHD REEL	24.92	0.66	3925.00	3996.00	
TOTAL SHOULDER	55.86	17.11	3943.00	3864.00	
TOTAL SHD / WT	0.38	0.12	3943.00	3864.00	
LF LAP BELT	39.47	17.41	3966.00	3874.00	8
RT LAP BELT	37.52	15.17	3966.00	3899.00	9
TOTAL LAP	76.99	33.30	3966.00	3874.00	
TOTAL LAP / WT	0.52	0.23	3966.00	3874.00	
CROTCH STRAP	66.07	-13.36	3964.00	3883.00	10
LF SEAT LNK X	27.47	-189.73	4133.00	3879.00	18
RT SEAT LNK X	49.03	-61.03	3826.00	3878.00	19
TOTAL SEAT X	31.21	-249.61	3825.00	3878.00	
SEAT LNK Y	46.79	-56.51	4110.00	3875.00	35
LF SEAT PAN Z	313.98	11.30	3878.00	3601.00	11
RT SEAT PAN Z	364.67	13.23	3880.00	3684.00	12
CT SEAT PAN Z	873.19	42.00	3881.00	3602.00	13
TOTAL SEAT Z	1547.98	78.13	3881.00	3601.00	
TOTAL SEAT Z / WT	10.53	0.53	3881.00	3601.00	
RES SEAT FORCE	1587.77	80.25	3881.00	3601.00	
RES SEAT FORCE / WT	10.67	0.55	3881.00	3601.00	
LF FOOT X	6.24	-174.59	3825.00	3885.00	20
RT FOOT X	31.05	-87.91	3824.00	3886.00	23
CT FOOT X	19.82	-216.31	3825.00	3886.00	26
TOTAL FOOT X	53.59	-476.09	3825.00	3886.00	
LF FOOT Y	131.77	-5.36	3869.00	3812.00	21
RT FOOT Y	20.18	-105.83	3910.00	3870.00	24
CT FOOT Y	5.50	-71.04	3736.00	3874.00	27
TOTAL FOOT Y	37.70	-41.13	3856.00	3834.00	
LF FOOT Z	153.03	4.97	3875.00	3946.00	22
RT FOOT Z	178.00	-4.86	3878.00	3825.00	25
CT FOOT Z	132.18	-27.66	3873.00	3818.00	28
TOTAL FOOT Z	422.83	11.58	3878.00	3715.00	
RES FOOT FORCE	598.74	53.19	3886.00	3696.00	

BRACING POSITIONS TEST: 560 SUBJ: M11 WT: 159.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
1DV EXT PWR	10.03	9.97	3691.00	417.00	48
CARRIAGE X	1.03	-1.27	3676.00	3935.00	36
CARRIAGE T	0.69	-0.30	3916.00	4080.00	31
CARRIAGE Z	11.24	-0.19	3911.00	3630.00	1
CARRIAGE Z (SM)	10.44	-0.10	3911.00	3717.00	29
CARRIAGE VEL	-1.23	-26.26	4162.00	3671.00	38
SEAT Z #2	12.05	-0.19	3918.00	3707.00	38
FOOT PLATE Z	12.17	-0.50	3920.00	3721.00	99
SEAT X	2.05	-1.44	3676.00	3935.00	32
SEAT Y	0.62	-1.03	3673.00	3879.00	33
SEAT Z	11.95	-0.28	3916.00	3727.00	34
SEAT Z (SM)	11.07	-0.14	3917.00	3727.00	34
CHEST X	2.39	-2.22	3930.00	3962.00	5
CHEST T	0.29	-1.57	3965.00	3930.00	6
CHEST Z	15.69	-0.83	3935.00	3751.00	7
CHEST RES	15.90	0.57	3937.00	3860.00	
CHEST SI	28.42		3673.00	4002.00	
HEAD X	.58	-4.19	3866.00	3958.00	
HEAD Y	2.36	0.35	3875.00	4064.00	
HEAD Z	12.07	-2.49	3932.00	4065.00	
HEAD RES	12.20	0.73	3932.00	4073.00	
HEAD SI	15.91		3865.00	4000.00	
HEAD MIC	12.23		3902.00	3962.00	
SHD REFL LF	32.73	2.86	4000.00	3921.00	14
SHD REEL LF	18.21	1.23	3964.00	3919.00	16
LF SHOULDER	47.30	4.39	3973.00	3920.00	
SHD REFL RT	40.99	5.20	4078.00	3917.00	15
SHD REEL RT	27.04	2.56	3966.00	3916.00	17
RT SHOULDER	57.68	7.83	4100.00	3917.00	
TOTAL SHLD REFL	67.48	9.05	4001.00	3920.00	
TOTAL SHLD REEL	44.76	4.30	3967.00	3918.00	
TOTAL SHOULDER	98.08	13.66	4100.00	3919.00	
TOTAL SHD / WT	0.62	0.09	4100.00	3919.00	
LF LAP BELT	32.55	7.54	4014.00	3942.00	8
RT LAP BELT	41.23	9.08	4031.00	3948.00	9
TOTAL LAP	71.77	16.62	4031.00	3948.00	
TOTAL LAP / WT	0.45	0.12	4031.00	3948.00	
CROTCH STRAP	160.04	-7.54	4085.00	3931.00	10
LF SEAT LNK X	12.50	-221.98	3870.00	3929.00	18
RT SEAT LNK X	23.39	-121.11	3877.00	3929.00	
TOTAL SEAT X	-4.11	-343.09	3606.00	3929.00	
SEAT LNK Y	45.71	-75.82	4152.00	3929.00	35
LF SEAT PAN Z	369.90	28.44	3926.00	3600.00	11
RT SEAT PAN Z	494.67	21.12	3930.00	3613.00	12
CT SEAT PAN Z	795.69	39.64	3931.00	3606.00	13
TOTAL SEAT Z	1675.05	102.40	3930.00	3607.00	
TOTAL SEAT Z / WT	10.53	0.64	3930.00	3607.00	
RES SEAT FORCE	1709.89	107.31	3930.00	3607.00	
RES SEAT FORCE / WT	10.75	0.67	3930.00	3607.00	
LF FOOT X	-22.75	-188.20	4020.00	3935.00	
RT FOOT X	30.38	-125.58	3902.00	3934.00	23
CT FOOT X	4.06	-232.05	3877.00	3935.00	26
TOTAL FOOT X	-8.76	-542.31	3876.00	3935.00	
LF FOOT Y	117.80	-15.84	3921.00	3865.00	21
RT FOOT Y	24.92	-108.20	4097.00	3921.00	24
CT FOOT Y	24.37	-65.52	3877.00	3924.00	27
TOTAL FOOT Y	75.35	-66.94	3877.00	3927.00	
LF FOOT Z	184.21	29.59	3933.00	3994.00	22
RT FOOT Z	210.64	8.82	3934.00	3878.00	25
CT FOOT Z	153.73	-59.55	3926.00	3606.00	28
TOTAL FOOT Z	443.05	43.84	3933.00	3636.00	
RES FOOT FORCE	697.06	88.05	3935.00	4022.00	

BRACING POSITIONS TEST: 557 SUBJ: M13 WT: 169.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
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10V EXT PWR	10.03	9.98	250.00	1030.00	48
CARRIAGE X	1.11	-0.92	3883.00	3918.00	36
CARRIAGE Y	0.82	-0.51	3934.00	3897.00	31
CARRIAGE Z	11.09	-0.20	3921.00	3695.00	1
CARRIAGE Z (SM)	10.48	-0.07	3921.00	3684.00	
CARRIAGE VEL	-0.99	-26.29	4190.00	3877.00	29
SEAT Z #2	12.17	-0.33	3927.00	3748.00	38
FOOT PLATE Z	12.18	-0.49	3929.00	3731.00	39
SEAT X	1.05	-1.17	3931.00	3894.00	32
SEAT Y	0.97	-1.65	3884.00	3889.00	33
SEAT Z	12.18	-0.31	3927.00	3749.00	34
SEAT Z (SM)	11.19	-0.17	3927.00	3749.00	
CHEST X	2.49	-1.70	3939.00	3998.00	5
CHEST Y	-0.21	-3.20	3988.00	3940.00	6
CHEST Z	14.11	-1.50	3945.00	3751.00	7
CHEST RES	14.49	0.98	3945.00	4176.00	
CHEST SI	25.39		3825.00	4015.00	
HEAD X	53	-3.01	3647.00	3981.00	2
HEAD Y	2.71	0.59	4055.00	3958.00	3
HEAD Z	13.13	-1.98	3940.00	4054.00	4
HEAD RES	13.19	0.98	3942.00	4168.00	
HEAD SI	17.39		3891.00	4018.00	
HEAD MIC	19.42		3913.00	3970.00	
SHD REFL LF	25.59	-0.95	4022.00	3930.00	14
SHD REEL LF	17.88	-0.30	4100.00	4058.00	16
LF SHOULDER	37.86	1.61	4100.00	3929.00	
SHD REFL RT	23.58	2.90	4017.00	3935.00	15
SHD REEL RT	16.39	0.00	4100.00	4059.00	17
RT SHOULDER	35.99	4.13	4010.00	3921.00	
TOTAL SHLD REFL	48.42	3.26	4022.00	3930.00	
TOTAL SHLD REEL	34.27	-0.29	4100.00	4058.00	
TOTAL SHOULDER	72.47	9.08	4100.00	3921.00	
TOTAL SHD / WT	0.43	0.05	4100.00	3921.00	
LF LAP BELT	41.09	11.98	4022.00	3934.00	
RT LAP BELT	46.04	13.38	4015.00	3929.00	8
TOTAL LAP	87.01	27.68	4014.00	3928.00	9
TOTAL LAP / WT	0.51	0.16	4014.00	3928.00	
CROTCH STRAP	114.12	14.10	4026.00	3939.00	
LF SEAT LNK X	40.29	-216.66	3851.00	3936.00	10
RT SEAT LNK X	15.21	-115.14	3985.00	3939.00	18
TOTAL SEAT X	22.04	-329.34	3845.00	3936.00	19
SEAT LNK Y	40.52	-86.48	4152.00	3933.00	35
LF SEAT PAN Z	363.20	27.90	3939.00	3609.00	11
RT SEAT PAN Z	453.07	26.55	3940.00	3614.00	12
CT SEAT PAN Z	932.51	39.27	3939.00	3603.00	13
TOTAL SEAT Z	1746.00	104.28	3939.00	3609.00	
TOTAL SEAT Z / WT	10.33	0.62	3939.00	3609.00	
RES SEAT FORCE	1778.15	105.48	3939.00	3609.00	
RES SEAT FORCE / WT	10.52	0.62	3939.00	3609.00	
LF FOOT X	-4.63	-166.47	3883.00	3943.00	20
RT FOOT X	16.05	-124.05	3884.00	3943.00	23
CT FOOT X	-7.28	-211.21	3884.00	3944.00	26
TOTAL FOOT X	2.34	-498.15	3884.00	3943.00	
LF FOOT Y	147.25	-11.72	3928.00	3872.00	21
RT FOOT Y	31.17	-139.22	3779.00	3926.00	24
CT FOOT Y	1.53	-57.00	4042.00	3933.00	27
TOTAL FOOT Y	48.82	-54.38	3903.00	3927.00	
LF FOOT Z	220.54	32.78	3941.00	3884.00	22
RT FOOT Z	243.33	45.67	3935.00	4053.00	25
CT FOOT Z	104.94	-117.16	3838.00	3620.00	
TOTAL FOOT Z	512.14	50.71	3939.00	4171.00	28
RES FOOT FORCE	686.42	120.94	3941.00	4024.00	

BRACING POSITIONS TEST: 559 SUBJ: P-3 WT: 202.0 G: 10 GP: 2 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
10V EXT PWR	10.03	9.98	706.00	1081.00	48
CARRIAGE X	0.65	-0.80	3826.00	3843.00	36
CARRIAGE T	0.66	-0.47	3875.00	3852.00	31
CARRIAGE Z	10.85	-0.17	3867.00	3776.00	1
CARRIAGE Z (SM)	10.28	-0.03	3866.00	3608.00	
CARRIAGE VEL	-1.23	-26.19	4169.00	3827.00	29
SEAT Z #2	12.27	-0.26	3873.00	3635.00	38
FOOT PLATE Z	12.36	-0.35	3871.00	3680.00	39
SEAT X	1.79	-0.98	3827.00	3917.00	32
SEAT Y	0.57	-0.99	3823.00	3830.00	33
SEAT Z	12.18	-0.18	3873.00	3679.00	34
SEAT Z (SM)	11.12	-0.11	3864.00	3921.00	5
CHEST X	3.97	-1.03	3865.00	3866.00	6
CHEST Y	-0.12	-1.86	3955.00	3693.00	7
CHEST Z	13.88	-0.93	3896.00	4153.00	
CHEST RES	14.18	0.67	3896.00	3956.00	
CHEST SI	23.34		3829.00	3918.00	2
HEAD X	.57	-4.17	3754.00	3816.00	3
HEAD Y	1.90	0.85	3993.00	4102.00	4
HEAD Z	11.55	-1.84	3880.00	4102.00	
HEAD RES	11.72	0.91	3887.00	3955.00	
HEAD SI	16.01		3853.00	3924.00	
HEAD HIC	13.14		3865.00	3868.00	14
SHD REFL LF	60.22	9.83	3865.00	3881.00	16
SHD REEL LF	47.16	3.20	4039.00	3881.00	
LF SHOULDER	80.02	14.80	4041.00	3877.00	15
SHD REFL RT	58.30	10.31	3962.00	3884.00	
SHD REEL RT	42.07	6.61	4044.00	3891.00	17
RT SHOULDER	86.38	17.41	3937.00	3886.00	
TOTAL SHD REFL	117.98	21.50	3964.00	3882.00	
TOTAL SHD REEL	88.29	10.49	4041.00	3885.00	
TOTAL SHOULDER	161.26	32.81	4057.00	3885.00	
TOTAL SHD / WT	0.80	0.16	4057.00	3885.00	
LF LAP BELT	63.73	15.63	3955.00	3878.00	8
RT LAP BELT	82.64	28.64	3963.00	3879.00	9
TOTAL LAP BELT	146.30	44.69	3963.00	3879.00	
TOTAL LAP	0.72	0.22	3963.00	3885.00	10
TOTAL LAP / WT	248.35	3.33	3967.00	3881.00	18
CROTCH STRAP	65.11	-207.39	4192.00	3882.00	19
LF SEAT LNK X	82.11	-37.18	3926.00	3882.00	
RT SEAT LNK X	92.69	-244.57	4190.00	3878.00	35
TOTAL SEAT X	86.79	-62.09	3972.00	3606.00	11
SEAT LNK Y	429.61	31.09	3883.00	3601.00	12
LF SEAT PAN Z	473.18	47.15	3883.00	3606.00	
RT SEAT PAN Z	1131.18	120.11	3883.00	3604.00	
CT SEAT PAN Z	2033.97	211.34	3883.00	3604.00	
TOTAL SEAT Z	10.07	1.05	3883.00	3604.00	
TOTAL SEAT Z / WT	2049.10	216.99	3883.00	3604.00	
RES SEAT FORCE	10.14	1.07	3883.00	3604.00	
RES SEAT FORCE / WT	-53.78	-237.31	4117.00	3888.00	20
LF FOOT X	-5.69	-187.21	4131.00	3888.00	23
RT FOOT X	-60.43	-275.98	3952.00	3890.00	26
CT FOOT X	-140.36	-690.63	4117.00	3889.00	
TOTAL FOOT X	155.23	-11.60	3869.00	4095.00	21
LF FOOT Y	34.13	-161.10	4102.00	3871.00	24
RT FOOT Y	16.09	-35.53	3686.00	3872.00	27
CT FOOT Y	33.02	-45.53	3844.00	3873.00	
TOTAL FOOT Y	288.33	53.06	3895.00	3968.00	22
LF FOOT Z	276.50	41.07	3880.00	4127.00	25
RT FOOT Z	95.61	-101.96	3884.00	3632.00	
CT FOOT Z	567.86	43.27	3865.00	4109.00	
TOTAL FOOT Z	881.46	155.98	3888.00	4121.00	
RES FOOT FORCE					28

BRACING POSITIONS TEST: 558 SUBJ: R-2 WT: 141.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CM
IOV EXT PWR	10.03	9.98	693.00	2220.00	48
CARRIAGE X	0.88	-1.23	3847.00	3880.00	36
CARRIAGE Y	0.84	-0.69	3990.00	3985.00	31
CARRIAGE Z	10.84	-0.18	3857.00	3714.00	1
CARRIAGE Z (SM)	10.31	-0.04	3858.00	3728.00	
CARRIAGE VEL	-1.04	-26.25	4144.00	3816.00	29
SEAT Z *2	12.63	-0.14	3864.00	3610.00	38
FOOT PLATE Z	12.33	-0.34	3866.00	3678.00	99
SEAT X	1.57	-1.24	3819.00	3880.00	32
SEAT Y	0.74	-1.20	3986.00	3621.00	33
SEAT Z	12.55	-0.14	3864.00	3683.00	34
SEAT Z (SM)	11.31	-0.09	3863.00	3682.00	
CHEST X	2.33	-0.74	3873.00	3928.00	5
CHEST Y	-0.48	-2.33	3937.00	3884.00	6
CHEST Z	14.86	-1.29	3880.00	3689.00	7
CHEST RES	15.14	1.02	3880.00	3811.00	
CHEST SI	23.29		3819.00	3935.00	
HEAD X	.48	-3.48	3770.00	3900.00	
HEAD Y	1.72	0.33	4001.00	3887.00	
HEAD Z	12.30	-1.37	3872.00	3756.00	
HEAD RES	12.39	1.00	3872.00	4199.00	
HEAD SI	15.98		3825.00	3942.00	
HEAD MIC	12.78		3848.00	3907.00	
SHD REFL LF	44.61	9.62	3942.00	3887.00	14
SHD REEL LF	18.98	5.32	4021.00	3889.00	16
LF SHOULDER	59.70	15.37	3942.00	3887.00	
SHD REFL RT	37.74	8.19	3941.00	3879.00	15
SHD REEL RT	24.28	4.96	4029.00	3870.00	17
RT SHOULDER	58.22	13.17	3933.00	3870.00	
TOTAL SHLD REFL	82.35	18.54	3942.00	3869.00	
TOTAL SHLD REEL	43.04	11.59	4021.00	3871.00	
TOTAL SHOULDER	116.11	30.31	3941.00	3870.00	
TOTAL SHD / WT	0.82	0.21	3941.00	3870.00	
LF LAP BELT	41.69	7.11	3951.00	3878.00	8
RT LAP BELT	55.78	11.51	3950.00	3871.00	9
TOTAL LAP	97.46	19.42	3950.00	3871.00	
TOTAL LAP / WT	0.69	0.14	3950.00	3871.00	
CROTCH STRAP	128.70	33.33	3952.00	3877.00	10
LF SEAT LNK X	76.51	-99.21	3951.00	3865.00	18
RT SEAT LNK X	88.04	-22.41	3908.00	3874.00	19
TOTAL SEAT X	131.66	-69.89	3932.00	3874.00	
SEAT LNK Y	76.51	1.15	3927.00	3864.00	35
LF SEAT PAN Z	215.60	15.60	3866.00	3611.00	11
RT SEAT PAN Z	291.40	23.82	3876.00	3614.00	12
CT SEAT PAN Z	1009.69	140.46	3874.00	3603.00	13
TOTAL SEAT Z	1501.65	183.97	3874.00	3600.00	
TOTAL SEAT Z / WT	10.65	1.30	3874.00	3600.00	
RES SEAT FORCE	1503.32	193.30	3874.00	3600.00	
RES SEAT FORCE / WT	10.66	1.37	3874.00	3600.00	
LF FOOT X	-36.00	-235.81	3818.00	3880.00	20
RT FOOT X	16.51	-125.36	3820.00	3879.00	23
CT FOOT X	-31.82	-259.90	3821.00	3880.00	26
TOTAL FOOT X	-61.19	-616.66	3821.00	3880.00	
LF FOOT Y	143.13	-8.86	3867.00	3956.00	21
RT FOOT Y	31.52	-109.58	3890.00	3864.00	24
CT FOOT Y	9.59	-62.49	3975.00	3871.00	27
TOTAL FOOT Y	55.03	-38.19	3839.00	3828.00	
LF FOOT Z	214.91	20.32	3879.00	3995.00	22
RT FOOT Z	208.56	0.33	3873.00	3980.00	25
CT FOOT Z	384.92	201.91	3874.00	3810.00	
TOTAL FOOT Z	709.20	310.33	3875.00	3681.00	
RES FOOT FORCE	919.46	345.22	3880.00	3681.00	

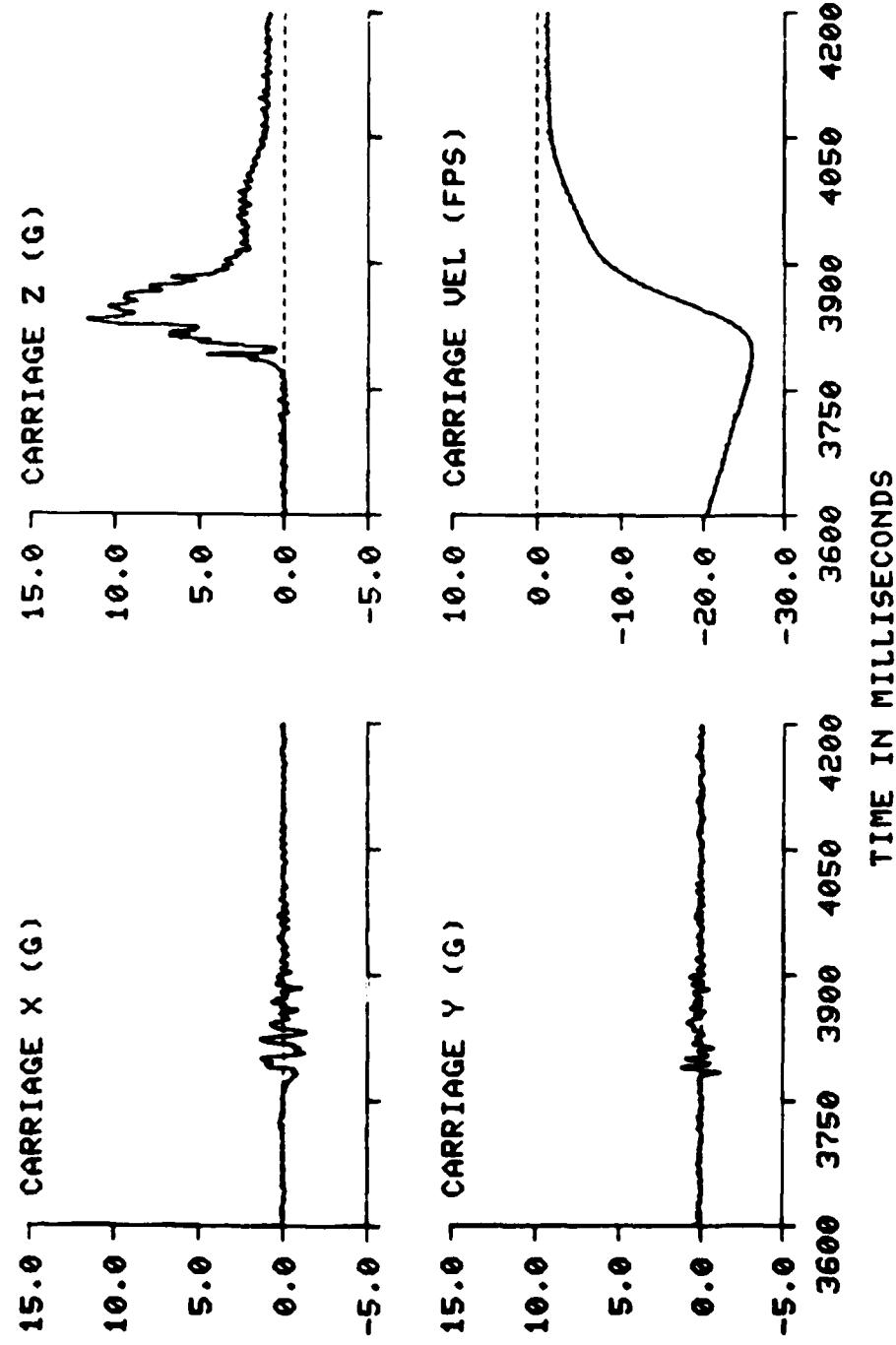
BRACING POSITIONS TEST: 54 / SUBJ: R-3 WT: 147.0 G: 10 GP: 1 CELL: L

DATA ID	MAX	MIN	T1	T2	CH
JOV EXT PWR	10.03	9.98	389.00	3472.00	48
CARRIAGE X	0.97	-1.27	3808.00	3842.00	36
CARRIAGE Y	0.90	-0.48	3855.00	4009.00	31
CARRIAGE Z	11.23	-0.16	3843.00	3650.00	1
CARRIAGE Z (SM)	10.34	-0.06	3843.00	3617.00	
CARRIAGE VEL	-1.13	-26.15	4157.00	3803.00	29
SEAT Z #2	12.56	-0.15	3850.00	3658.00	38
FOOT PLATE Z	14.14	-0.30	3852.00	3653.00	39
SEAT X	1.30	-1.27	3808.00	3842.00	32
SEAT Y	0.61	-1.10	3802.00	3806.00	33
SEAT Z	12.49	-0.13	3850.00	3653.00	34
SEAT Z (SM)	11.41	-0.09	3850.00	3660.00	
CHEST X	2.29	-1.48	3860.00	3898.00	5
CHEST Y	-0.10	-1.85	3888.00	3835.00	6
CHEST Z	15.33	-0.85	3871.00	3670.00	7
CHEST RES	15.47	0.79	3871.00	4112.00	
CHEST SI	26.51		3803.00	3928.00	
HEAD X	.73	-4.45	3801.00	3895.00	23
HEAD Y	3.44	0.29	3975.00	4034.00	24
HEAD Z	11.91	-1.33	3866.00	3780.00	
HEAD RES	12.13	0.57	3866.00	4060.00	
HEAD SI	15.97		3815.00	3949.00	
HEAD MIC	12.58		3830.00	3914.00	
SHD REFL LF	52.94	5.32	3928.00	3843.00	14
SHD REEL LF	36.03	7.02	4023.00	3859.00	16
LF SHOULDER	77.88	15.01	3909.00	3855.00	
SHD REFL RT	38.11	12.43	3934.00	3889.00	15
SHD REEL RT	57.68	9.52	3906.00	3865.00	17
RT SHOULDER	87.79	25.20	3908.00	3853.00	
TOTAL SHLD REFL	90.31	18.90	3929.00	3883.00	
TOTAL SHLD REEL	88.89	18.31	3906.00	3863.00	
TOTAL SHOULDER	165.53	40.42	3909.00	3854.00	
TOTAL SHD / WT	1.13	0.27	3909.00	3854.00	
LF LAP BELT	43.57	13.24	3919.00	3860.00	8
RT LAP BELT	72.36	20.60	3927.00	3851.00	9
TOTAL LAP	115.04	34.17	3928.00	3852.00	
TOTAL LAP / WT	0.78	0.23	3928.00	3852.00	
CROTCH STRAP	129.14	7.78	4100.00	3861.00	10
LF SEAT LNK X	35.74	-206.81	3799.00	3860.00	16
RT SEAT LNK X	57.09	-12.40	3900.00	3795.00	19
TOTAL SEAT X	44.68	-205.06	4185.00	3860.00	
SEAT LNK Y	70.03	-74.60	4043.00	3861.00	35
LF SEAT PAN Z	392.81	43.62	3862.00	3809.00	11
RT SEAT PAN Z	303.62	31.02	3859.00	4199.00	12
CT SEAT PAN Z	895.01	102.80	3862.00	3605.00	13
TOTAL SEAT Z	1591.17	194.74	3862.00	3610.00	
TOTAL SEAT Z / WT	10.82	1.32	3862.00	3610.00	
RES SEAT FORCE	1605.24	199.91	3862.00	3610.00	
RES SEAT FORCE / WT	10.82	1.36	3862.00	3610.00	
LF FOOT X	10.92		3862.00	3610.00	
RT FOOT X	-6.85	-178.64	3830.00	3867.00	20
CT FOOT X	28.62	-87.69	3834.00	3866.00	23
TOTAL FOOT X	-0.86	-207.47	3809.00	3866.00	26
LF FOOT Y	145.28	-471.14	3809.00	3867.00	
RT FOOT Y	32.57	-110.31	3887.00	3852.00	24
CT FOOT Y	24.22	-92.36	3808.00	3855.00	27
TOTAL FOOT Y	70.87	-55.79	3809.00	3860.00	
LF FOOT Z	166.02	-3.46	3868.00	3805.00	22
RT FOOT Z	204.62	-10.74	3867.00	3810.00	25
CT FOOT Z	84.81	-49.58	3834.00	3999.00	
TOTAL FOOT Z	374.70	13.88	3855.00	3701.00	28
RES FOOT FORCE	588.81	55.44	3867.00	3699.00	

BRACING POSITIONS TEST: 564 SUBJ: S-3 WT: 168.0 G: 10 GP: 1 CELL: L  
 DATA ID MAX MIN T1 T2 CH  
 IOV EXT PWR 10.06 9.96 3704.00 1198.00 48  
 CARRIAGE X 0.96 -1.02 3842.00 3929.00 36  
 CARRIAGE Y 0.98 -0.53 3890.00 4006.00 31  
 CARRIAGE Z 11.11 -0.23 3881.00 3649.00 1  
 CARRIAGE Z (SM) 10.57 -0.12 3880.00 3600.00  
 CARRIAGE VEL -1.09 -26.33 4170.00 3835.00 29  
 SEAT Z \*2 11.77 -0.22 3887.00 3698.00 38  
 FOOT PLATE Z 12.43 -0.46 3885.00 3689.00 39  
 SEAT X 1.16 -1.10 3842.00 3851.00 32  
 SEAT Y 0.81 -0.86 4014.00 4010.00 33  
 SEAT Z 11.78 -0.16 3887.00 3672.00 34  
 SEAT Z (SM) 11.14 -0.12 3887.00 3696.00  
 CHEST X 3.86 -0.91 3896.00 3939.00 5  
 CHEST Y -0.62 -3.11 4014.00 3903.00 6  
 CHEST Z 14.33 -1.05 3900.00 3685.00 7  
 CHEST RES 14.99 0.93 3900.00 3762.00  
 CHEST SI 26.69 3841.00 3981.00  
 HEAD X 0.89 -4.39 4200.00 3930.00 2  
 HEAD Y 1.82 0.50 3895.00 3931.00  
 HEAD Z 12.69 -1.64 3902.00 3602.00  
 HEAD RES 12.84 1.31 3902.00 4139.00  
 HEAD SI 16.00 3853.00 3977.00  
 HEAD HIC 12.17 3869.00 3923.00  
 SHD REFL LF 40.78 3.68 3987.00 3883.00 14  
 SHD REEL LF 42.57 9.03 3933.00 3896.00 16  
 LF SHOULDER 67.54 14.26 3933.00 3884.00  
 SHD REFL RT 33.59 5.14 4097.00 3887.00 15  
 SHD REEL RT 48.83 11.04 3939.00 3912.00 17  
 RT SHOULDER 64.32 17.32 3938.00 3887.00  
 TOTAL SHD REFL 67.33 9.31 3987.00 3883.00  
 TOTAL SHD REEL 65.11 20.52 3936.00 3896.00  
 TOTAL SHOULDER 129.11 32.35 3935.00 3885.00  
 TOTAL SHD / WT 0.77 0.19 3935.00 3885.00  
 LF LAP BELT 41.51 24.86 3968.00 3886.00 8  
 RT LAP BELT 55.23 24.86 3967.00 3886.00 9  
 TOTAL LAP 96.57 49.72 3967.00 3886.00  
 TOTAL LAP / WT 0.57 0.30 3967.00 3886.00  
 CROTCH STRAP 119.75 -12.83 4096.00 3896.00 10  
 LF SEAT LNK X 48.48 -196.96 3737.00 3896.00 18  
 RT SEAT LNK X 39.41 -60.81 3945.00 3895.00 19  
 TOTAL SEAT X 35.09 -255.46 3711.00 3901.00  
 SEAT LNK Y 40.74 -88.69 4127.00 3900.00 35  
 LF SEAT PAN Z 471.28 59.77 3891.00 3828.00 11  
 RT SEAT PAN Z 539.80 47.16 3897.00 3600.00 12  
 CT SEAT PAN Z 744.08 76.65 3904.00 3618.00 13  
 TOTAL SEAT Z 1731.82 193.63 3902.00 3601.00  
 TOTAL SEAT Z / WT 10.31 1.15 3902.00 3601.00  
 RES SEAT FORCE 1752.20 196.71 3902.00 3601.00  
 RES SEAT FORCE / WT 10.43 1.17 3902.00 3601.00  
 LF FOOT X -25.08 -167.93 3891.00 3894.00 20  
 RT FOOT X 31.72 -105.74 3842.00 3906.00 23  
 CT FOOT X -9.98 -210.33 3842.00 3807.00 26  
 TOTAL FOOT X -8.76 -471.37 3842.00 3907.00  
 LF FOOT Y 115.53 -16.37 3892.00 4016.00 21  
 RT FOOT Y 23.64 -131.66 4083.00 3885.00 24  
 CT FOOT Y 32.00 -50.76 3703.00 3902.00 27  
 TOTAL FOOT Y 56.08 -49.63 3860.00 3900.00  
 LF FOOT Z 176.36 10.74 3894.00 3983.00 22  
 RT FOOT Z 178.24 -5.29 3907.00 3744.00 25  
 CT FOOT Z 197.23 -49.41 3888.00 3837.00 28  
 TOTAL FOOT Z 438.76 25.10 3902.00 4163.00  
 RES FOOT FORCE 639.33 77.46 3902.00 3974.00

BRACING POSITIONS STUDY

TEST: 562 SUBJ: F-2

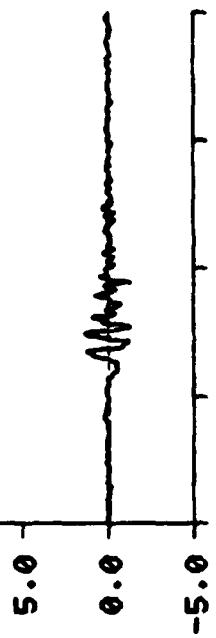


BRAVICING POSITIONS STUDY

TEST: 562

SUBJ: F-2

15.0 SEAT X (G)

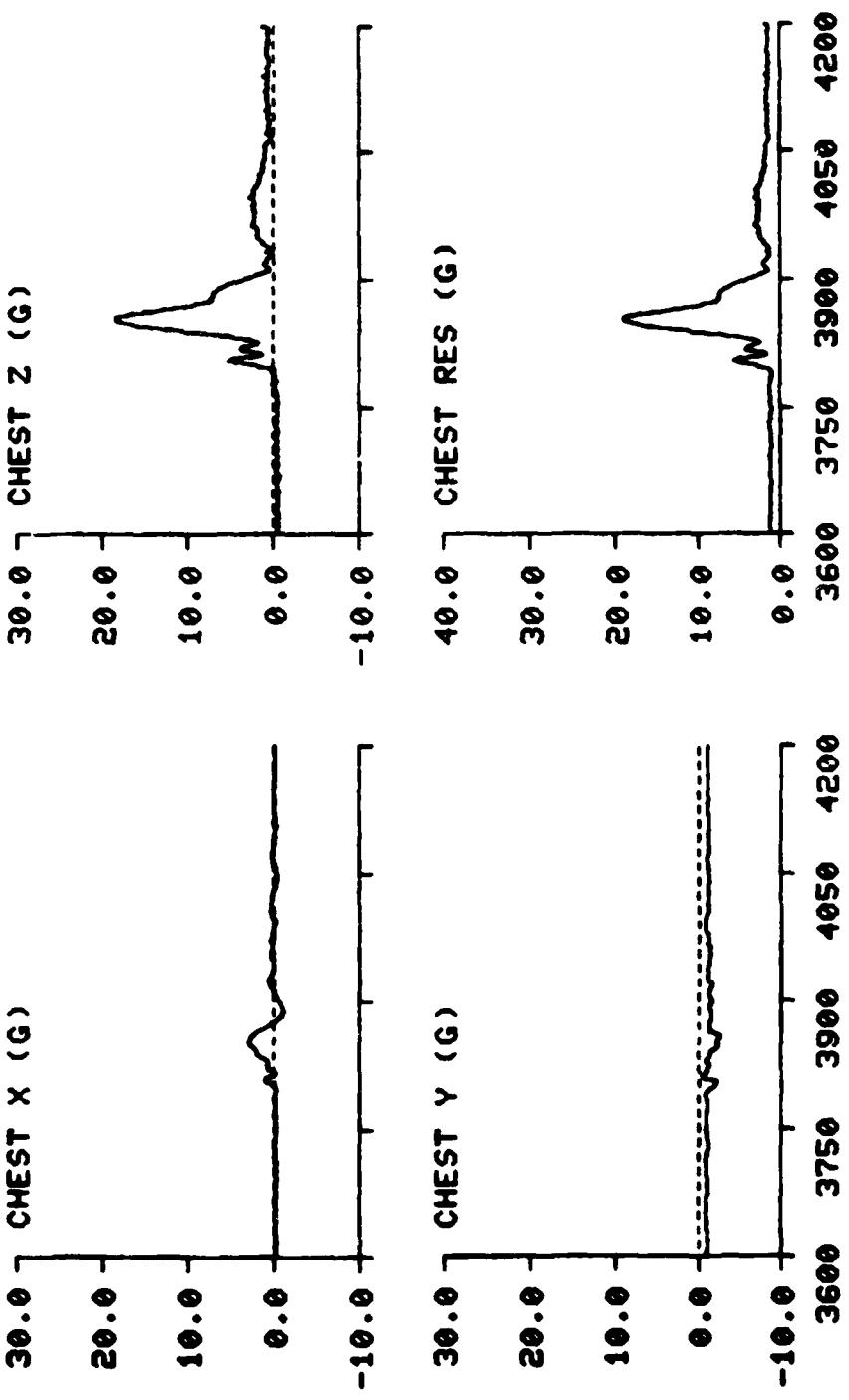


15.0 SEAT Y (G)



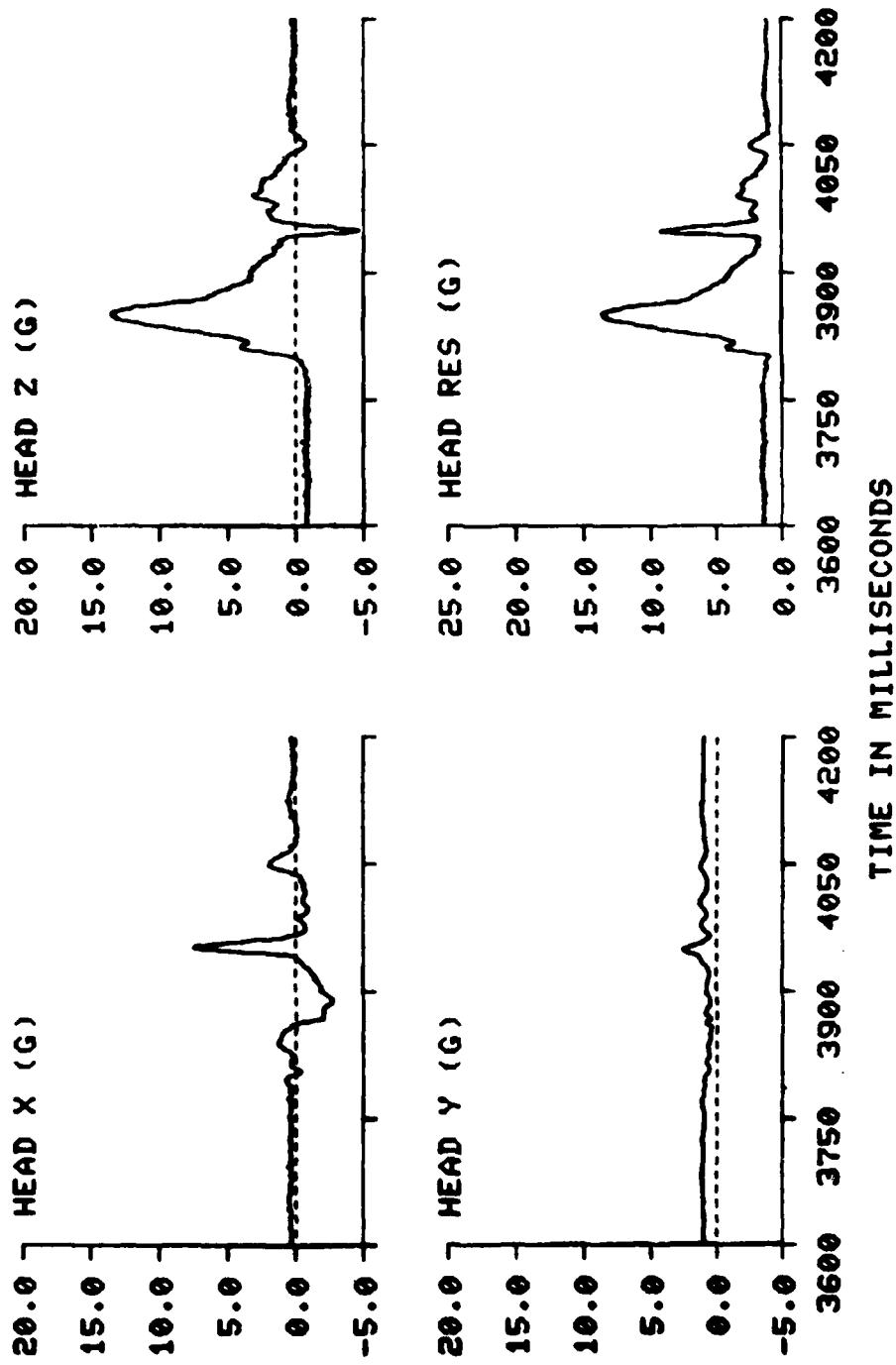
BRAVICING POSITIONS STUDY

TEST: 562 SUBJ: F-2



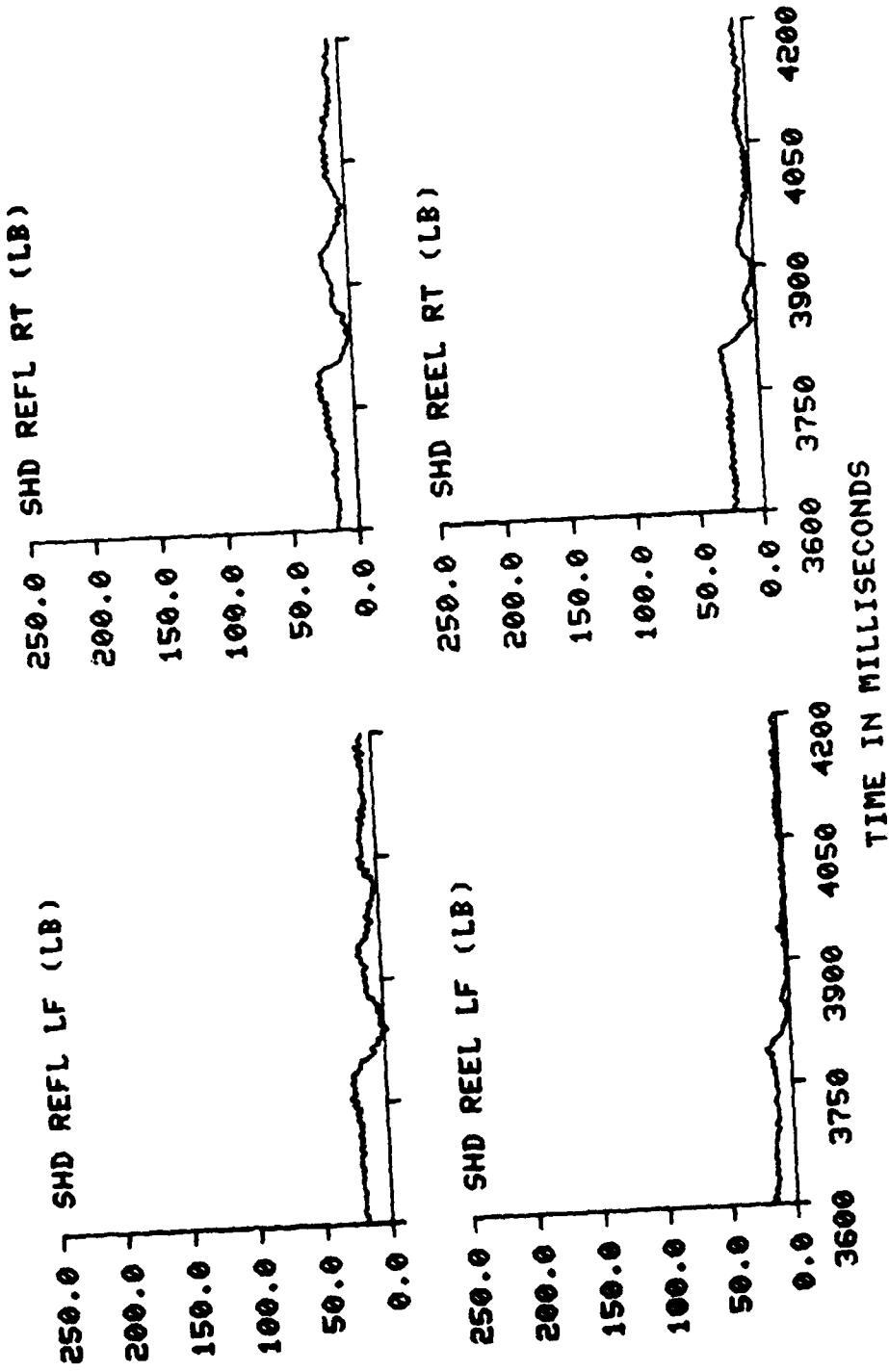
BRACING POSITIONS STUDY

TEST: 562 SUBJ: F-2

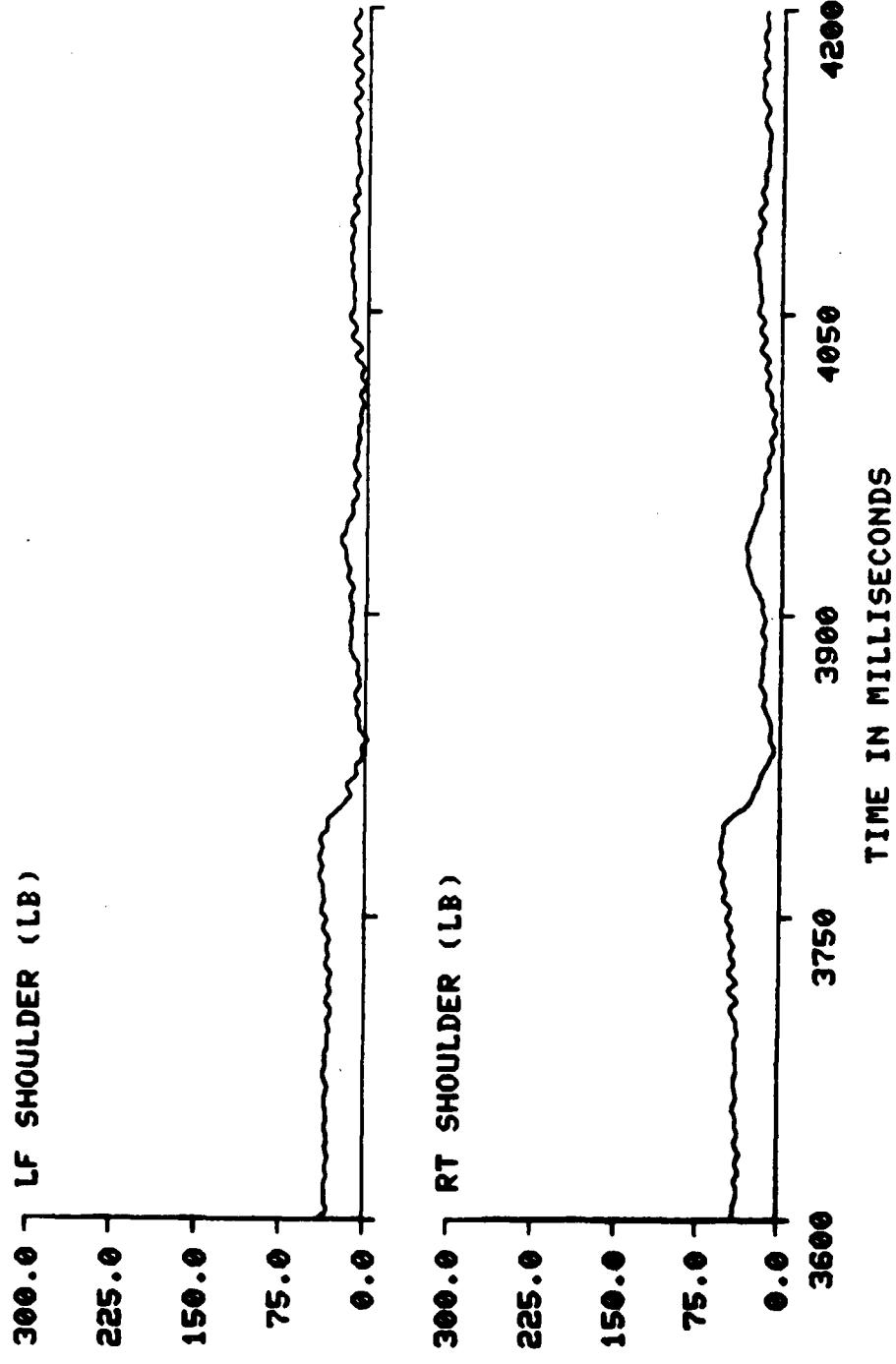


BRACING POSITIONS STUDY

TEST: 562 SUBJ: F-2

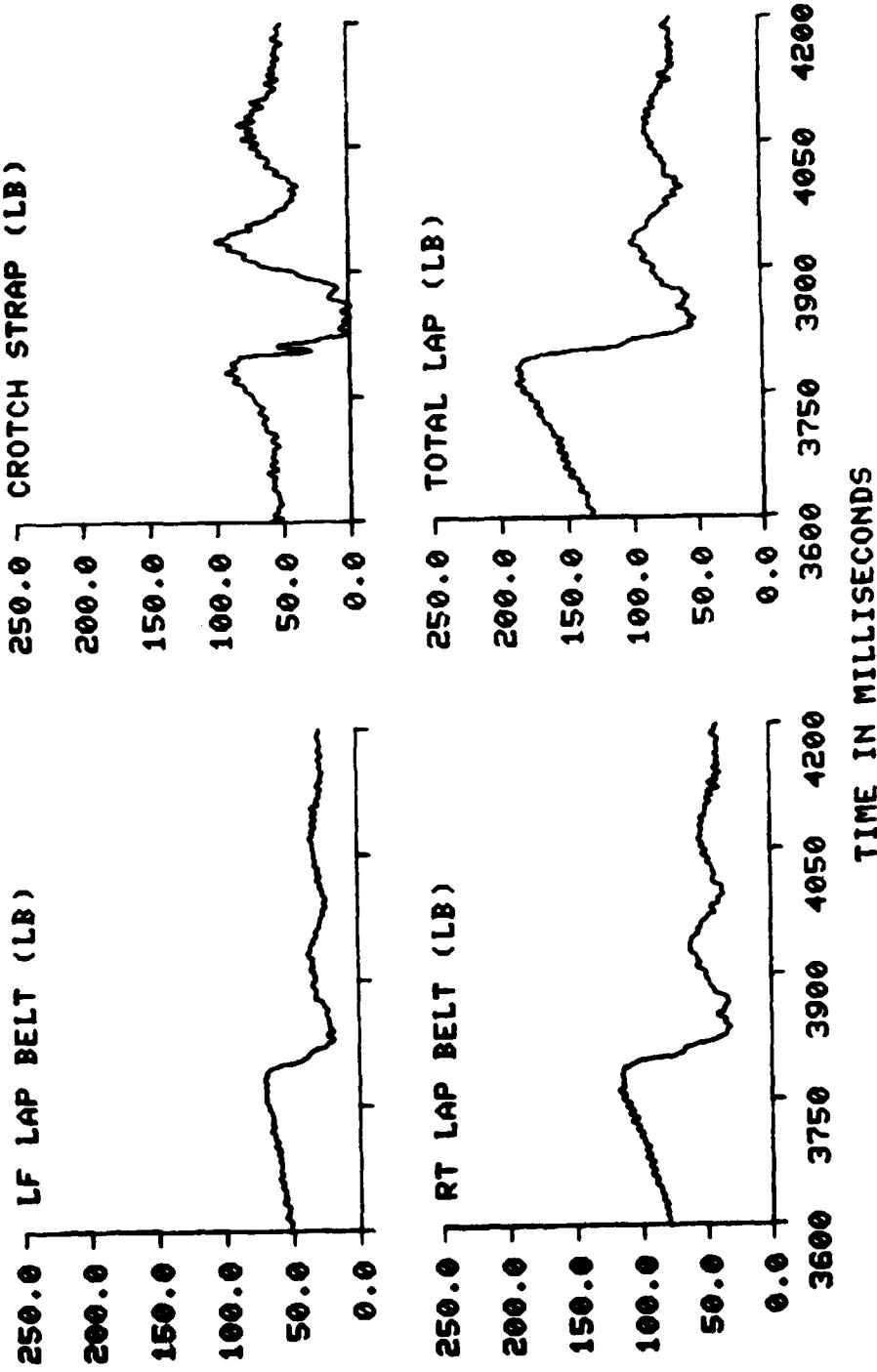


BRAVIC POSITIONS STUDY TEST: 562 SUBJ: F-2



**BRACING POSITIONS STUDY**

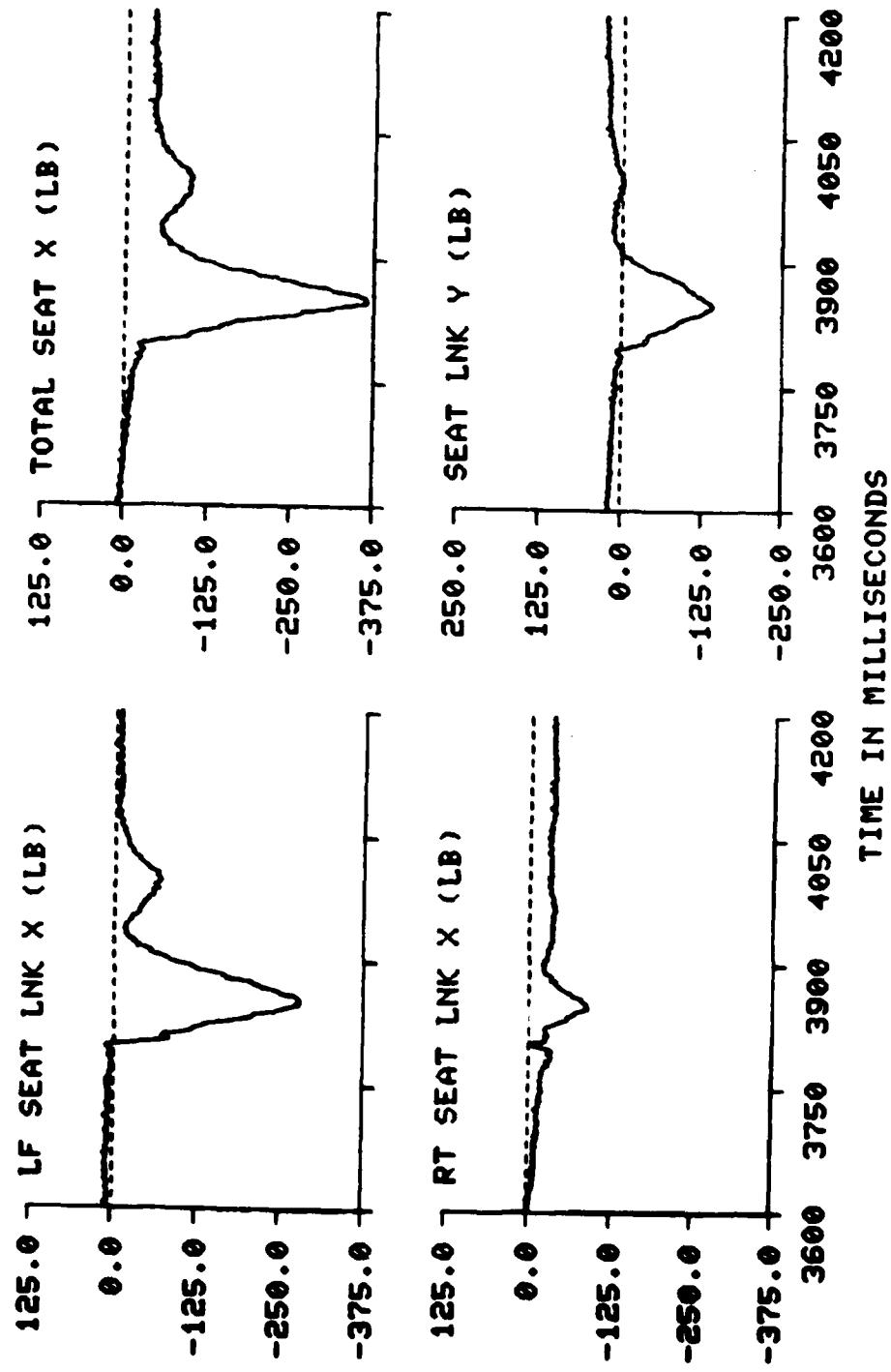
**TEST: 562      SUBJ: F-2**



BRACING POSITIONS STUDY

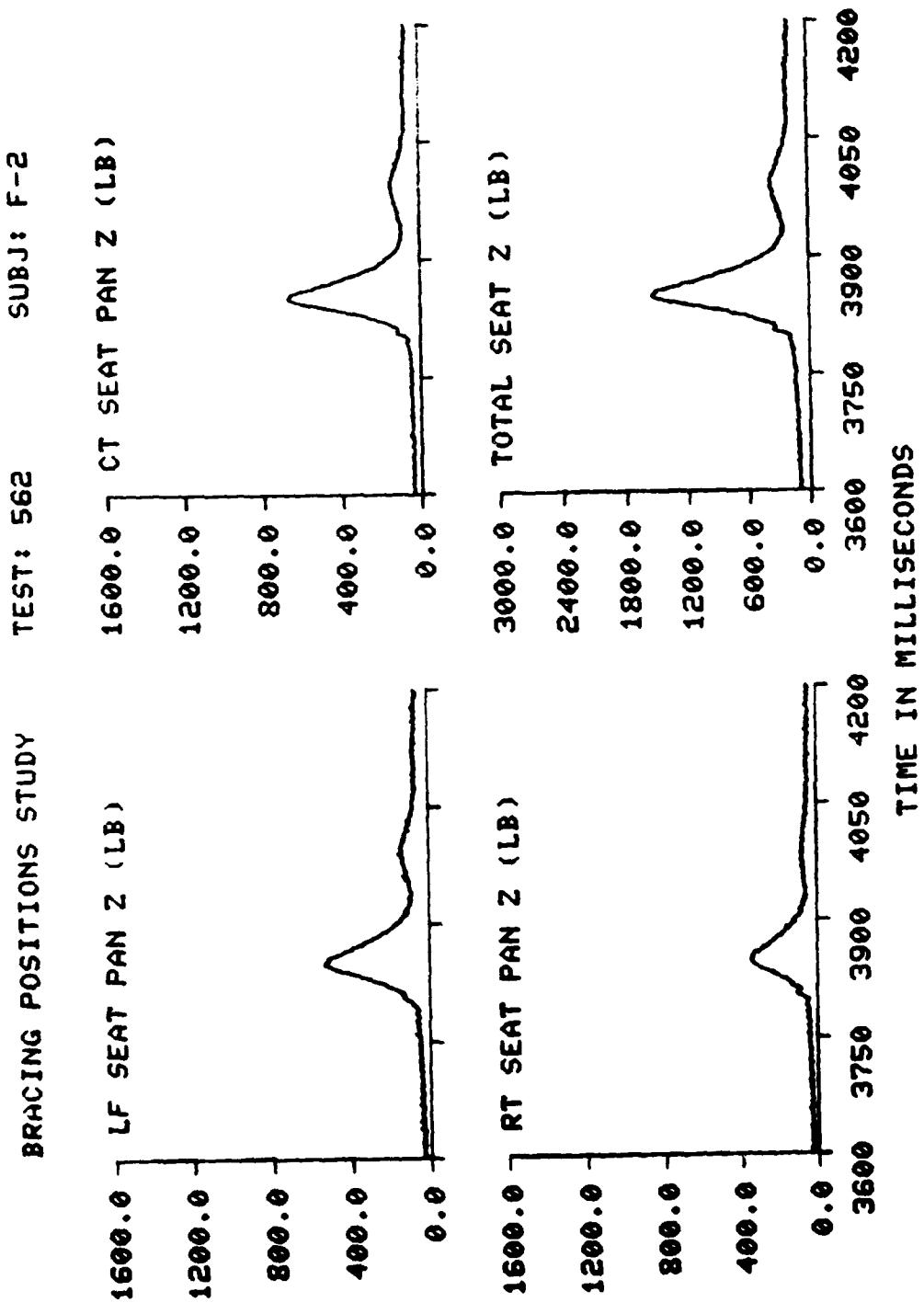
TEST: 562

SUBJ: F-2



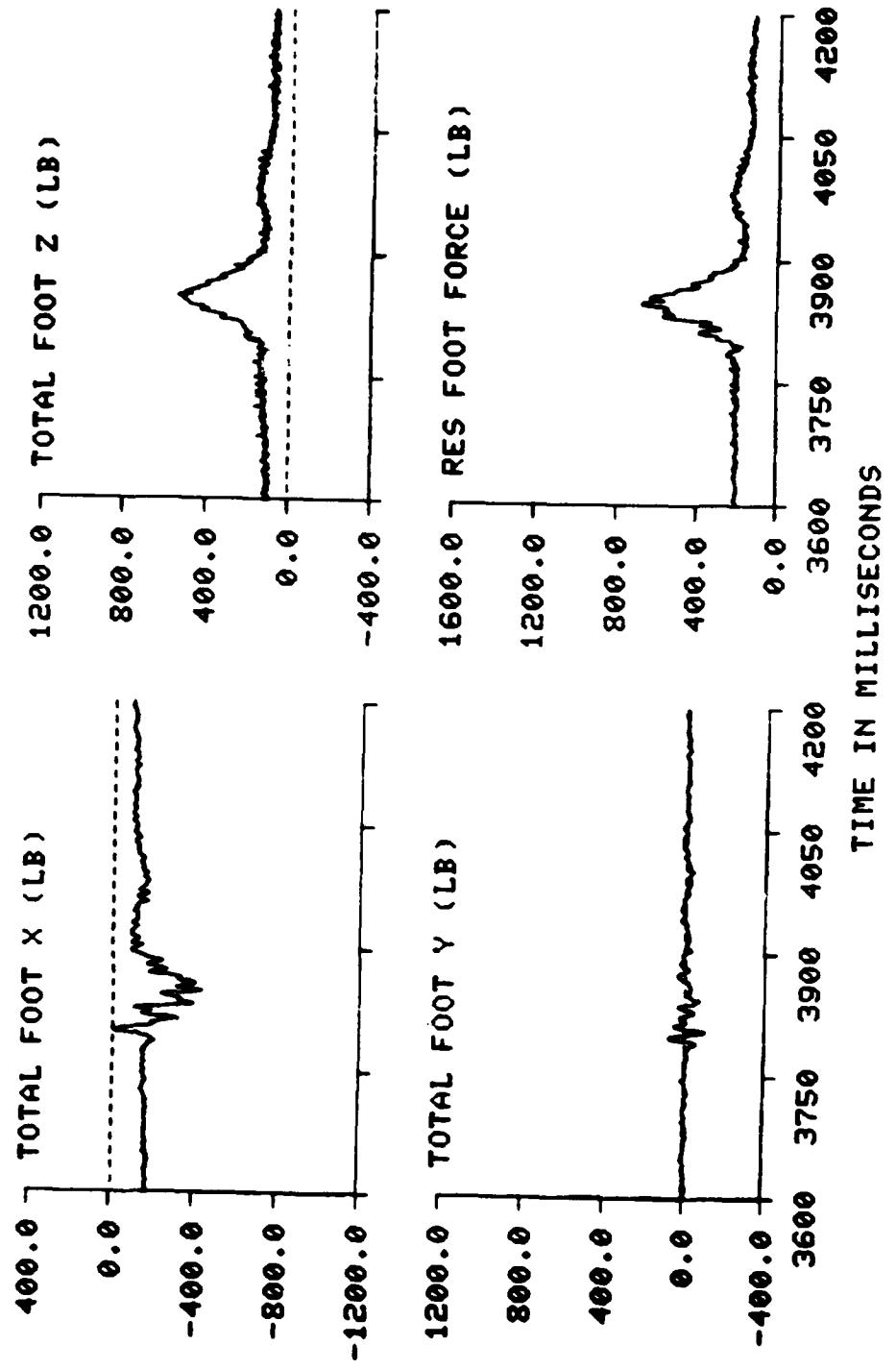
BRACING POSITIONS STUDY

TEST: 562



BRACING POSITIONS STUDY

TEST: 562      SUBJ: F-2



## APPENDIX C

### WILCOXON ANALYSES

The electronic data from this test program were analyzed by means of the Wilcoxon paired-replicate rank test (Wilcoxon & Wilcox, 1964). A total of three comparisons were made by this technique. The means and estimated standard deviations of each parameter in each comparison are summarized in Tables C-1 through C-3. Since the number of comparable tests in one comparison may be different from the number of comparable tests in another comparison, minor variations in the means and standard deviations in a cell of the test matrix may be noted among these tables. An asterisk designates a statistically significant trend in a parameter at the 90% confidence level for a two-tailed test. The statistically significant trends in all six comparisons are summarized in the body of the report in Table 5.

The Wilcoxon analyses of parameters for which there were statistically significant differences are also presented. In these computations, the arithmetic difference between the parameter means from each condition is first computed. These differences are then rank ordered from smallest to largest, without regard to sign. An integer from 1 to n, where n is the number of pairs in the comparison, is assigned to each difference so that the smallest difference receives the rank 1 and the largest difference receives the rank n. Then, the rank integer is given the same sign as the sign of the arithmetic difference to which it corresponds. The negative integers are summed and the positive integers are summed. Finally, if either sum is greater than or equal to the critical integer sum for the specified confidence level, then the means may be considered significantly different (i.e., from two different samples).

A complete set of Wilcoxon computations for all comparisons in this test program will be maintained by the Biomechanical Protection Branch of AFAMRL until this work unit is retired. These data will eventually be recorded in a permanent data bank within the Laboratory.

TABLE C-1

## COMPARISON G-K

SUMMARY OF ELECTRONICALLY MEASURED AND COMPUTED DATA FROM WILCOXON ANALYSIS

(Peak values are tabulated for velocity, accelerations and loads.)

(n = 12)

TEST CONDITION BRACING POSITION	G		K		Significant at 90% Confidence
	Hands-in-Lap		Crossed-Arms		
	Mean	St Dev	Mean	St Dev	
CARRIAGE ACCELERATION (G)	10.6	0.20	10.6	0.26	
CARRIAGE VELOCITY (ft/sec)	-26.0	0.47	-26.2	0.07	*
SEAT ACCELERATION (G)	10.8	0.36	11.3	0.18	*
CHEST ACCELERATION (G)					
-X axis	-2.24	0.64	-1.08	0.89	*
+X axis	3.32	0.97	2.97	0.82	
+Z axis	16.6	1.54	16.5	1.88	
Resultant	16.8	1.56	16.7	1.82	
CHEST SEVERITY INDEX	31.7	3.59	29.0	3.09	*
HEAD ACCELERATION (G)					
-X axis	-2.94	0.75	-3.51	1.34	
+X axis	1.56	0.89	1.10	0.70	*
+Z axis	12.7	0.69	11.1	0.98	
Resultant	12.8	0.69	11.4	0.85	
HEAD SEVERITY INDEX	20.1	1.61	16.1	1.26	*
STRAP LOADS (lb)					
Reflection Straps	65	19	106	30	*
Inertia Reel Straps	78	27	207	41	*
Total Shoulder Straps	135	38	280	56	*
Total Lap Belt	85	30	83	22	
Crotch Strap	109	33	89	31	*
SEAT PAN LOADS (lb)					
-X axis	-274	75	-263	74	
+Z axis	1660	240	1660	229	
Resultant	1680	243	1690	234	
FOOTREST LOADS (lb)					
-X axis	-399	66	-363	64	*
+Z axis	476	64	370	53	*
Resultant	582	77	501	75	*

TABLE C-2  
COMPARISON G-L  
SUMMARY OF ELECTRONICALLY MEASURED AND COMPUTED DATA FROM WILCOXON ANALYSIS  
(Peak values are tabulated for velocity, accelerations and loads.)

(n = 17)

TEST CONDITION BRACING POSITION	G		L		Significant at 90% Confidence
	Hands-in-Lap		Hands-on-Knees		
	Mean	St Dev	Mean	St Dev	
CARRIAGE ACCELERATION (G)	10.6	0.21	10.5	0.24	
CARRIAGE VELOCITY (ft/sec)	-25.9	0.58	-26.2	0.06	*
SEAT ACCELERATION (G)	10.8	0.34	11.2	0.14	*
CHEST ACCELERATION (G)					
-X axis	-2.09	0.66	-1.73	0.67	
+X axis	3.44	1.07	2.73	0.99	*
+Z axis	17.3	2.14	15.5	1.38	*
Resultant	17.5	2.10	15.9	1.33	*
CHEST SEVERITY INDEX	32.8	4.07	28.0	3.64	*
HEAD ACCELERATION (G)					
-X axis	-3.17	1.07	-3.42	0.91	
+X axis	1.79	0.95	1.11	0.92	*
+Z axis	12.5	0.78	12.3	0.77	
Resultant	12.7	0.82	12.5	0.72	
HEAD SEVERITY INDEX	19.5	2.12	17.3	1.73	*
STRAP LOADS (lb)					
Reflection Straps	67	16	71	21	
Inertia Reel Straps	81	23	64	25	*
Total Shoulder Straps	141	32	122	35	*
Total Lap Belt	92	26	104	19	*
Crotch Strap	115	41	140	56	*
SEAT PAN LOADS (lb)					
-X axis	-286	54	-255	71	*
+Z axis	1780	250	1700	222	*
Resultant	1810	250	1730	223	*
FOOTREST LOADS (lb)					
-X axis	-399	93	-539	115	*
+Z axis	474	73	476	106	
Resultant	578	109	709	137	*

TABLE C-3

## COMPARISON K-L

SUMMARY OF ELECTRONICALLY MEASURED AND COMPUTED DATA FROM WILCOXON ANALYSIS

(Peak values are tabulated for velocity, accelerations and loads.)

(n = 11)

TEST CONDITION BRACING POSITION	K		L		Significant at 90% Confidence
	Crossed-Arms		Hands-on-Knees		
	Mean	St Dev	Mean	St Dev	
CARRIAGE ACCELERATION (G)	10.6	0.28	10.4	0.21	
CARRIAGE VELOCITY (ft/sec)	-26.2	0.07	-26.3	0.05	
SEAT ACCELERATION (G)	11.3	0.16	11.3	0.14	
CHEST ACCELERATION (G)					
-X axis	-1.05	0.92	-1.51	0.51	
+X axis	2.99	0.86	2.77	0.91	
+Z axis	16.5	1.97	15.6	1.61	
Resultant	16.8	1.89	15.9	1.56	
CHEST SEVERITY INDEX	29.1	3.23	27.9	3.93	
HEAD ACCELERATION (G)					
-X axis	-3.47	0.70	-3.57	1.39	
+X axis	0.82	0.46	1.13	0.72	
+Z axis	11.2	1.03	12.4	0.83	*
Resultant	11.4	0.89	12.5	0.80	*
HEAD SEVERITY INDEX	16.0	1.30	17.3	1.77	*
STRAP LOADS (lb)					
Reflection Straps	108	30	69	24	*
Inertia Reel Straps	213	39	57	26	*
Total Shoulder Straps	286	55	112	38	*
Total Lap Belt	86	21	99	21	*
Crotch Strap	91	31	136	47	*
SEAT PAN LOADS (lb)					
-X axis	-276	63	-254	87	*
+Z axis	1700	192	1630	186	*
Resultant	1730	195	1650	188	*
FOOTREST LOADS (lb)					
-X axis	-370	62	-540	112	*
+Z axis	378	46	476	117	*
Resultant	514	63	709	133	*

### MILCOXON ANALYSIS

#### ANALYSIS OF: CARRIAGE VEL

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

RBS  
RBS

SUBJ	A VAL	B VAL	A-B	GRD -	GRD +	N	N -	N +
M10	26.22	26.17	0.05	-0.01	0.00	1.00	1.00	0.00
H-3	25.87	26.17	-0.30	-0.02	0.00	2.00	2.00	0.00
R13	26.14	26.18	-0.04	-0.04	0.00	3.00	3.00	0.00
R-2	26.19	26.24	-0.05	0.00	0.05	4.50	0.00	4.50
F-3	24.54	26.17	-1.63	-0.05	0.00	4.50	4.50	0.00
H-5	25.99	26.25	-0.26	-0.07	0.00	6.00	6.00	0.00
M11	26.18	26.32	-0.14	-0.14	0.00	7.00	7.00	0.00
F-4	26.17	26.33	-0.16	-0.16	0.00	8.00	8.00	0.00
P-3	25.72	26.36	-0.64	-0.26	0.00	9.00	9.00	0.00
S-3	26.13	26.20	-0.07	-0.30	0.00	10.00	10.00	0.00
F-2	26.23	26.24	-0.01	-0.64	0.00	11.00	11.00	0.00
G-2	26.17	26.19	-0.02	-1.63	0.00	12.00	12.00	0.00

MEAN A: 25.96 STD DEV A: 0.47 SUM OF N MINUS: 73.50 -----  
MEAN B: 26.24 STD DEV B: 0.07 SUM OF N PLUS : ----- 4.50

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### MILCOXON ANALYSIS

#### ANALYSIS OF: SEAT Z (SM)

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	GRD -	GRD +	N	N -	N +
M10	10.71	11.35	-0.64	-0.06	0.00	1.00	1.00	0.00
H-3	11.04	11.10	-0.06	-0.07	0.00	2.00	2.00	0.00
R13	10.47	11.30	-0.83	0.00	0.10	3.00	0.00	3.00
R-2	10.57	11.28	-0.71	-0.20	0.00	4.00	4.00	0.00
F-3	10.56	11.49	-0.93	-0.35	0.00	5.00	5.00	0.00
H-5	11.22	11.42	-0.20	-0.55	0.00	6.00	6.00	0.00
M11	10.57	11.12	-0.55	-0.58	0.00	7.00	7.00	0.00
F-4	11.33	11.40	-0.07	-0.64	0.00	8.00	8.00	0.00
P-3	10.80	11.44	-0.64	-0.64	0.00	9.00	9.00	0.00
S-3	11.46	11.36	0.10	-0.71	0.00	10.00	10.00	0.00
F-2	10.42	11.00	-0.58	-0.83	0.00	11.00	11.00	0.00
G-2	10.83	10.98	-0.35	-0.93	0.00	12.00	12.00	0.00

MEAN A: 10.81 STD DEV A: 0.36 SUM OF N MINUS: 75.00 -----  
MEAN B: 11.27 STD DEV B: 0.18 SUM OF N PLUS : ----- 3.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: CHEST X

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

MIN  
MIN

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	-1.45	-0.71	-0.74	-0.13	0.00	1.00	1.00	0.00
H-3	-3.31	-0.61	-2.70	0.00	0.46	2.00	0.00	2.00
M13	-2.04	-0.55	-1.49	-0.60	0.00	3.00	3.00	0.00
R-2	-1.49	-0.69	-0.80	-0.74	0.00	4.00	4.00	0.00
F-3	-2.67	-1.07	-1.60	-0.80	0.00	5.00	5.00	0.00
H-5	-3.19	-3.65	0.46	-0.92	0.00	6.00	6.00	0.00
M11	-2.30	-0.77	-1.53	-1.45	0.00	7.00	7.00	0.00
F-4	-1.78	-1.65	-0.13	-1.49	0.00	8.00	8.00	0.00
P-3	-2.81	-0.50	-2.31	-1.53	0.00	9.00	9.00	0.00
S-3	-1.52	-0.60	-0.92	-1.60	0.00	10.00	10.00	0.00
F-2	-2.19	-0.74	-1.45	-2.31	0.00	11.00	11.00	0.00
G-2	-2.07	-1.47	-0.60	-2.70	0.00	12.00	12.00	0.00

MEAN A: -2.24 STD DEV A: 0.64 SUM OF N MINUS: 76.00 -----  
MEAN B: -1.08 STD DEV B: 0.89 SUM OF N PLUS : ----- 2.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: CHEST SI

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	31.63	29.04	2.59	0.00	0.40	1.00	0.00	1.00
H-3	36.85	32.67	4.18	-0.57	0.00	2.00	2.00	0.00
M13	29.09	30.07	-0.98	-0.98	0.00	3.00	3.00	0.00
R-2	28.41	24.38	4.03	-1.24	0.00	4.00	4.00	0.00
F-3	28.36	26.20	2.16	-1.47	0.00	5.00	5.00	0.00
H-5	29.33	28.93	0.40	0.00	2.16	6.00	0.00	6.00
M11	35.47	27.03	8.44	0.00	2.58	7.00	0.00	7.00
F-4	29.62	31.09	-1.47	0.00	2.59	8.00	0.00	8.00
P-3	36.78	24.47	12.31	0.00	4.03	9.00	0.00	9.00
S-3	30.76	32.00	-1.24	0.00	4.18	10.00	0.00	10.00
F-2	36.38	39.80	2.58	0.00	8.44	11.00	0.00	11.00
G-2	28.03	28.60	-0.57	0.00	12.31	12.00	0.00	12.00

MEAN A: 31.73 STD DEV A: 3.59 SUM OF N MINUS: 14.00 -----  
MEAN B: 29.02 STD DEV B: 3.09 SUM OF N PLUS : ----- 64.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: HERO X**

**FUNCTION A = G: 10**

**CELL: G**

**MAX**

**FUNCTION B = G: 10**

**CELL: K**

**MAX**

SUBJ	A VAL	B VAL	A-B	GRO -	GRO +	N	N -	N +
M10	1.61	2.19	-0.58	0.00	0.01	1.00	0.00	1.00
H-3	3.05	1.67	1.38	0.00	0.15	2.00	0.00	2.00
M13	1.60	0.56	1.04	-0.23	0.00	3.00	3.00	0.00
R-2	0.37	0.36	0.01	-0.32	0.00	4.00	4.00	0.00
F-3	0.83	0.48	0.35	0.00	0.35	5.00	0.00	5.00
H-5	2.53	1.73	0.80	0.00	0.38	6.00	0.00	6.00
M11	1.52	1.84	-0.32	0.00	0.39	7.00	0.00	7.00
F-4	0.94	0.56	0.38	-0.58	0.00	8.00	8.00	0.00
P-3	0.92	0.53	0.39	0.00	0.80	9.00	0.00	9.00
S-3	2.09	1.94	0.15	0.00	1.04	10.00	0.00	10.00
F-2	2.74	0.60	2.14	0.00	1.38	11.00	0.00	11.00
G-2	0.48	0.71	-0.23	0.00	2.14	12.00	0.00	12.00

MEAN A: 1.56 STD DEV A: 0.89 SUM OF N MINUS: 15.00 -----  
 MEAN B: 1.10 STD DEV B: 0.70 SUM OF N PLUS : ----- 63.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: HERO Z**

**FUNCTION A = G: 10**

**CELL: G**

**MAX**

**FUNCTION B = G: 10**

**CELL: K**

**MAX**

SUBJ	A VAL	B VAL	A-B	GRO -	GRO +	N	N -	N +
M10	12.69	10.80	1.89	0.00	0.52	1.00	0.00	1.00
H-3	11.37	10.51	0.86	0.00	0.65	2.00	0.00	2.00
M13	12.76	11.20	1.56	0.00	0.86	3.00	0.00	3.00
R-2	12.82	9.81	3.01	0.00	1.25	4.00	0.00	4.00
F-3	11.86	10.61	1.25	0.00	1.37	5.00	0.00	5.00
H-5	13.12	11.34	1.78	0.00	1.56	6.00	0.00	6.00
M11	12.26	10.54	1.72	0.00	1.72	7.00	0.00	7.00
F-4	13.90	13.25	0.65	0.00	1.75	8.00	0.00	8.00
P-3	12.30	10.27	2.03	0.00	1.78	9.00	0.00	9.00
S-3	13.46	11.71	1.75	0.00	1.89	10.00	0.00	10.00
F-2	13.10	12.58	0.52	0.00	2.03	11.00	0.00	11.00
G-2	12.40	11.03	1.37	0.00	3.01	12.00	0.00	12.00

MEAN A: 12.67 STD DEV A: 0.69 SUM OF N MINUS: 0.00 -----  
 MEAN B: 11.14 STD DEV B: 0.98 SUM OF N PLUS : ----- 76.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: HERO RES

FUNCTION A = G: 10      CELL: G  
 FUNCTION B = G: 10      CELL: K

ABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	12.79	11.09	1.70	0.00	0.54	1.00	0.00	1.00
H-3	11.76	11.22	0.54	0.00	0.60	2.00	0.00	2.00
M13	12.94	11.31	1.63	0.00	0.65	3.00	0.00	3.00
R-2	12.92	10.89	2.03	0.00	1.20	4.00	0.00	4.00
F-3	11.86	10.63	1.23	0.00	1.23	5.00	0.00	5.00
M-5	13.48	11.44	2.04	0.00	1.63	6.00	0.00	6.00
M11	12.36	10.72	1.64	0.00	1.64	7.00	0.00	7.00
F-4	13.92	13.27	0.65	0.00	1.70	8.00	0.00	8.00
F-3	12.33	10.41	1.92	0.00	1.76	9.00	0.00	9.00
S-3	13.63	11.87	1.76	0.00	1.92	10.00	0.00	10.00
F-2	13.36	12.76	0.60	0.00	2.03	11.00	0.00	11.00
G-2	12.43	11.23	1.20	0.00	2.04	12.00	0.00	12.00

MEAN A: 12.82      STD DEV A: 0.69      SUM OF N MINUS: 0.00 -----  
 MEAN B: 11.40      STD DEV B: 0.85      SUM OF N PLUS : ----- 78.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: HERO SI

FUNCTION A = G: 10      CELL: G  
 FUNCTION B = G: 10      CELL: K

ABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	22.95	15.44	7.51	0.00	1.05	1.00	0.00	1.00
H-3	19.03	16.02	3.01	0.00	2.60	2.00	0.00	2.00
M13	18.29	15.69	2.60	0.00	2.79	3.00	0.00	3.00
R-2	21.33	15.72	5.61	0.00	2.85	4.00	0.00	4.00
F-3	18.92	14.27	4.65	0.00	2.92	5.00	0.00	5.00
M-5	21.82	16.34	5.48	0.00	3.01	6.00	0.00	6.00
M11	18.62	15.83	2.79	0.00	3.62	7.00	0.00	7.00
F-4	20.90	18.05	2.85	0.00	4.65	8.00	0.00	8.00
F-3	19.61	13.78	5.83	0.00	5.48	9.00	0.00	9.00
S-3	20.07	17.15	2.92	0.00	5.61	10.00	0.00	10.00
F-2	21.32	17.70	3.62	0.00	5.83	11.00	0.00	11.00
G-2	17.74	16.69	1.05	0.00	7.51	12.00	0.00	12.00

MEAN A: 20.05      STD DEV A: 1.61      SUM OF N MINUS: 0.00 -----  
 MEAN B: 16.06      STD DEV B: 1.26      SUM OF N PLUS : ----- 78.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### MILCOXON ANALYSIS

ANALYSIS OF:

TOTAL SHLD REFL

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	46.58	88.21	-41.63	-12.94	0.00	1.00	1.00	0.00
M-3	87.34	122.87	-35.53	-25.61	0.00	2.00	2.00	0.00
M13	62.45	100.21	-37.76	-30.68	0.00	3.00	3.00	0.00
R-2	57.47	70.41	-12.94	-35.53	0.00	4.00	4.00	0.00
F-3	81.51	157.97	-76.46	-37.11	0.00	5.00	5.00	0.00
H-5	69.00	99.68	-30.68	-37.76	0.00	6.00	6.00	0.00
M11	52.19	77.80	-25.61	-41.10	0.00	7.00	7.00	0.00
F-4	66.49	103.60	-37.11	-41.63	0.00	8.00	8.00	0.00
F-3	103.17	187.05	-63.88	-45.93	0.00	9.00	9.00	0.00
S-3	57.13	98.23	-41.10	-51.49	0.00	10.00	10.00	0.00
F-2	53.74	99.67	-45.93	-63.88	0.00	11.00	11.00	0.00
G-2	37.22	88.71	-51.49	-76.46	0.00	12.00	12.00	0.00

MEAN A: 64.52 STD DEV A: 18.52 SUM OF N MINUS: 78.00 -----  
MEAN B: 106.20 STD DEV B: 29.49 SUM OF N PLUS : ----- 0.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### MILCOXON ANALYSIS

ANALYSIS OF:

TOTAL SHLD REEL

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	62.54	154.70	-92.16	-88.58	0.00	1.00	1.00	0.00
M-3	113.38	244.37	-130.99	-92.16	0.00	2.00	2.00	0.00
M13	63.32	239.46	-156.14	-106.76	0.00	3.00	3.00	0.00
R-2	59.15	145.73	-86.58	-110.82	0.00	4.00	4.00	0.00
F-3	110.45	254.00	-143.55	-115.62	0.00	5.00	5.00	0.00
H-5	114.10	220.86	-106.76	-124.05	0.00	6.00	6.00	0.00
M11	62.06	177.88	-115.62	-130.99	0.00	7.00	7.00	0.00
F-4	43.20	230.81	-187.61	-139.73	0.00	8.00	8.00	0.00
F-3	107.85	247.58	-139.73	-143.55	0.00	9.00	9.00	0.00
S-3	72.82	235.66	-162.84	-156.14	0.00	10.00	10.00	0.00
F-2	62.66	186.71	-124.05	-162.84	0.00	11.00	11.00	0.00
G-2	38.83	150.85	-110.82	-187.61	0.00	12.00	12.00	0.00

MEAN A: 77.81 STD DEV A: 27.48 SUM OF N MINUS: 78.00 -----  
MEAN B: 207.35 STD DEV B: 41.36 SUM OF N PLUS : ----- 0.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS****ANALYSIS OF: TOTAL SHOULDER**FUNCTION A = G: 10  
FUNCTION B = G: 10CELL: G  
CELL: KMAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	106.31	221.02	-114.71	-85.76	0.00	1.00	1.00	0.00
H-3	178.60	346.36	-167.76	-113.74	0.00	2.00	2.00	0.00
M13	144.84	297.83	-152.99	-114.71	0.00	3.00	3.00	0.00
R-2	108.69	194.45	-85.76	-129.37	0.00	4.00	4.00	0.00
F-3	185.90	336.36	-150.46	-140.42	0.00	5.00	5.00	0.00
H-5	181.18	310.55	-129.37	-143.92	0.00	6.00	6.00	0.00
M11	107.22	220.96	-113.74	-150.46	0.00	7.00	7.00	0.00
F-4	106.55	288.92	-182.37	-152.99	0.00	8.00	8.00	0.00
F-3	184.03	356.23	-172.20	-167.76	0.00	9.00	9.00	0.00
S-3	123.68	314.23	-190.55	-172.20	0.00	10.00	10.00	0.00
F-2	116.39	256.81	-140.42	-182.37	0.00	11.00	11.00	0.00
G-2	75.90	219.82	-143.92	-190.55	0.00	12.00	12.00	0.00

MEAN A: 134.94 STD DEV A: 38.36 SUM OF N MINUS: 78.00 -----  
MEAN B: 280.30 STD DEV B: 55.87 SUM OF N PLUS : ----- 0.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS****ANALYSIS OF: CROTCH STRAP**FUNCTION A = G: 10  
FUNCTION B = G: 10CELL: G  
CELL: KMAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	82.79	89.42	13.37	-2.69	0.00	1.00	1.00	0.00
H-3	136.90	84.82	52.08	0.00	5.67	2.00	0.00	2.00
M13	119.85	94.16	25.89	0.00	7.23	3.00	0.00	3.00
R-2	85.80	68.49	-2.69	0.00	8.08	4.00	0.00	4.00
F-3	144.89	72.51	72.38	0.00	13.37	5.00	0.00	5.00
H-5	74.30	121.19	-46.89	0.00	24.25	6.00	0.00	6.00
M11	118.66	84.41	24.25	0.00	25.69	7.00	0.00	7.00
F-4	93.94	88.71	7.23	0.00	26.40	8.00	0.00	8.00
F-3	173.09	165.01	8.08	-46.89	0.00	9.00	9.00	0.00
S-3	109.23	48.46	62.77	0.00	52.08	10.00	0.00	10.00
F-2	120.59	94.19	26.40	0.00	62.77	11.00	0.00	11.00
G-2	73.26	67.59	5.67	0.00	72.38	12.00	0.00	12.00

MEAN A: 109.44 STD DEV A: 32.72 SUM OF N MINUS: 10.00 -----  
MEAN B: 88.75 STD DEV B: 30.54 SUM OF N PLUS : ----- 68.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### MILCOXON ANALYSIS

ANALYSIS OF: TOTAL FOOT X

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

MIN  
MIN

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	-376.39	-307.29	-69.10	-6.92	0.00	1.00	1.00	0.00
M-3	-434.90	-381.84	-53.06	-13.22	0.00	2.00	2.00	0.00
M13	-367.29	-421.60	54.31	0.00	14.14	3.00	0.00	3.00
R-2	-417.13	-431.27	14.14	0.00	39.46	4.00	0.00	4.00
F-3	-558.37	-458.76	-99.61	-52.87	0.00	5.00	5.00	0.00
M-5	-414.75	-407.83	-6.92	-53.06	0.00	6.00	6.00	0.00
M11	-346.81	-386.27	39.46	0.00	54.31	7.00	0.00	7.00
F-4	-333.12	-258.02	-75.10	-67.25	0.00	8.00	8.00	0.00
F-3	-475.41	-379.51	-95.90	-69.10	0.00	9.00	9.00	0.00
S-3	-555.24	-342.02	-13.22	-75.10	0.00	10.00	10.00	0.00
F-2	-349.93	-297.06	-52.87	-95.90	0.00	11.00	11.00	0.00
G-2	-355.25	-288.00	-67.25	-99.61	0.00	12.00	12.00	0.00

MEAN A: -398.72 STD DEV A: 66.00 SUM OF N MINUS: 64.00 -----  
MEAN B: -363.29 STD DEV B: 63.95 SUM OF N PLUS : ----- 14.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### MILCOXON ANALYSIS

ANALYSIS OF: TOTAL FOOT Z

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	384.16	333.96	50.20	-22.09	0.00	1.00	1.00	0.00
M-3	539.15	438.71	100.44	0.00	31.26	2.00	0.00	2.00
M13	522.47	444.56	-22.09	0.00	50.20	3.00	0.00	3.00
R-2	484.84	368.84	116.00	0.00	100.44	4.00	0.00	4.00
F-3	485.08	375.83	109.25	0.00	108.77	5.00	0.00	5.00
M-5	474.70	332.74	141.96	0.00	109.25	6.00	0.00	6.00
M11	381.60	360.34	31.26	0.00	116.00	7.00	0.00	7.00
F-4	490.65	307.42	183.23	0.00	119.56	8.00	0.00	8.00
F-3	543.72	434.95	108.77	0.00	135.82	9.00	0.00	9.00
S-3	587.24	367.32	199.92	0.00	141.96	10.00	0.00	10.00
F-2	532.23	398.41	135.82	0.00	163.23	11.00	0.00	11.00
G-2	395.33	275.77	119.56	0.00	199.92	12.00	0.00	12.00

MEAN A: 475.93 STD DEV A: 64.22 SUM OF N MINUS: 1.00 -----  
MEAN B: 368.74 STD DEV B: 52.93 SUM OF N PLUS : ----- 77.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: RES FOOT FORCE

FUNCTION A = G: 10

CELL: G

ABS

FUNCTION B = G: 10

CELL: K

ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	472.25	446.13	26.12	-5.08	0.00	1.00	1.00	0.00
H-3	672.39	569.10	103.29	0.00	26.12	2.00	0.00	2.00
M13	548.31	603.70	-55.39	-55.39	0.00	3.00	3.00	0.00
R-2	620.83	532.23	88.60	0.00	88.60	4.00	0.00	4.00
F-3	679.80	574.80	105.00	0.00	95.69	5.00	0.00	5.00
H-5	595.09	499.40	95.69	0.00	103.29	6.00	0.00	6.00
M11	509.86	514.94	-5.08	0.00	105.00	7.00	0.00	7.00
F-4	506.65	391.94	114.71	0.00	106.56	8.00	0.00	8.00
P-3	701.91	565.30	136.61	0.00	110.74	9.00	0.00	9.00
S-3	585.10	474.36	110.74	0.00	114.71	10.00	0.00	10.00
F-2	592.61	486.05	106.56	0.00	133.97	11.00	0.00	11.00
G-2	493.33	359.36	133.97	0.00	138.61	12.00	0.00	12.00

MEAN A: 581.51 STD DEV A: 77.36 SUM OF N MINUS: 4.00 -----

MEAN B: 501.44 STD DEV B: 74.98 SUM OF N PLUS : ----- 74.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: CARRIAGE VEL

FUNCTION A = G: 10

CELL: G

MIN

FUNCTION B = G: 10

CELL: L

MIN

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	-26.22	-26.17	-0.05	0.00	0.01	1.00	0.00	1.00
M-2	-26.20	-26.30	0.10	0.00	0.04	2.00	0.00	2.00
H-3	-25.87	-26.34	0.47	0.00	0.04	3.00	0.00	3.00
K-1	-24.33	-26.12	1.79	-0.05	0.00	4.00	4.00	0.00
M10	-26.22	-26.27	0.05	0.00	0.05	5.00	0.00	5.00
S-3	-26.19	-26.33	0.20	0.00	0.06	6.00	0.00	6.00
G-3	-26.20	-26.24	0.04	0.00	0.08	7.50	0.00	7.50
H-4	-26.19	-26.20	0.01	-0.08	0.00	7.50	7.50	0.00
R-3	-26.23	-26.15	-0.08	0.00	0.10	9.00	0.00	9.00
F-3	-24.54	-26.26	1.72	0.00	0.13	10.00	0.00	10.00
F-4	-26.17	-26.30	0.13	0.00	0.15	11.00	0.00	11.00
H-5	-25.99	-26.19	0.20	0.00	0.20	12.50	0.00	12.50
M13	-26.14	-26.29	0.15	0.00	0.20	12.50	0.00	12.50
R-2	-26.19	-26.25	0.06	0.00	0.47	14.00	0.00	14.00
P-3	-25.72	-26.19	0.47	0.00	0.47	15.00	0.00	15.00
M11	-26.18	-26.26	0.08	0.00	1.72	16.00	0.00	16.00
F-2	-26.23	-26.27	0.04	0.00	1.79	17.00	0.00	17.00

MEAN A: -25.93 STD DEV A: 0.58 SUM OF N MINUS: 11.50 -----

MEAN B: -26.24 STD DEV B: 0.06 SUM OF N PLUS : ----- 141.50

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: SEAT Z (SM)

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	10.73	11.10	-0.37	0.00	0.01	1.00	0.00	1.00
M-2	10.33	11.12	-0.79	0.00	0.14	2.00	0.00	2.00
H-3	11.04	11.34	-0.30	-0.16	0.00	3.00	3.00	0.00
K-1	10.42	11.24	-0.82	-0.30	0.00	4.00	4.00	0.00
M10	10.71	11.30	-0.59	0.00	0.32	5.50	0.00	5.50
S-3	11.46	11.14	0.32	-0.32	0.00	5.50	5.50	0.00
G-3	10.66	11.20	-0.54	-0.37	0.00	7.00	7.00	0.00
H-4	11.02	11.01	0.01	-0.50	0.00	8.00	8.00	0.00
R-3	10.55	11.41	-0.86	-0.54	0.00	9.00	9.00	0.00
F-3	10.56	11.46	-0.90	-0.59	0.00	10.00	10.00	0.00
F-4	11.33	11.49	-0.16	-0.72	0.00	11.00	11.00	0.00
H-5	11.22	11.08	0.14	-0.74	0.00	12.00	12.00	0.00
M13	10.47	11.19	-0.72	-0.79	0.00	13.00	13.00	0.00
R-2	10.57	11.31	-0.74	-0.82	0.00	14.50	14.50	0.00
P-3	10.80	11.12	-0.32	-0.82	0.00	14.50	14.50	0.00
M11	10.57	11.07	-0.50	-0.86	0.00	16.00	16.00	0.00
F-2	10.42	11.24	-0.82	-0.90	0.00	17.00	17.00	0.00

MEAN A: 10.76 STD DEV A: 0.34 SUM OF N MINUS: 144.50 -----  
MEAN B: 11.22 STD DEV B: 0.14 SUM OF N PLUS : ----- 8.50

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: CHEST X

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	4.52	4.09	0.43	-0.11	0.00	1.00	1.00	0.00
M-2	1.83	1.18	0.65	-0.12	0.00	2.00	2.00	0.00
H-3	4.28	3.83	0.45	0.00	0.43	3.00	0.00	3.00
K-1	4.58	4.06	0.52	0.00	0.45	4.00	0.00	4.00
M10	3.20	2.60	0.60	0.00	0.49	5.50	0.00	5.50
S-3	3.77	3.88	-0.11	0.00	0.49	5.50	0.00	5.50
G-3	4.20	2.76	1.44	0.00	0.52	7.00	0.00	7.00
H-4	2.42	1.84	0.78	0.00	0.60	8.00	0.00	8.00
R-3	4.13	2.29	1.84	0.00	0.60	9.00	0.00	9.00
F-3	2.07	2.19	-0.12	0.00	0.65	10.00	0.00	10.00
F-4	3.46	2.97	0.49	0.00	0.78	11.00	0.00	11.00
H-5	1.35	0.86	0.49	0.00	1.00	12.00	0.00	12.00
M13	3.49	2.49	1.00	0.00	1.44	13.00	0.00	13.00
R-2	4.93	2.33	2.60	-1.47	0.00	14.00	14.00	0.00
P-3	2.50	3.97	-1.47	0.00	1.54	15.00	0.00	15.00
M11	3.93	2.39	1.54	0.00	1.84	16.00	0.00	16.00
F-2	3.53	2.93	0.60	0.00	2.60	17.00	0.00	17.00

MEAN A: 3.42 STD DEV A: 1.05 SUM OF N MINUS: 17.00 -----  
MEAN B: 2.73 STD DEV B: 0.99 SUM OF N PLUS : ----- 136.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: CHEST Z**

**FUNCTION A = G: 10**

**CELL: G  
CELL: L**

**MAX  
MAX**

SUBJ	A VAL	B VAL	A-B	GRO -	GRO +	N	N -	N +
D-1	14.63	17.01	-2.38	0.00	0.46	1.00	0.00	1.00
M-2	18.66	16.04	2.62	-0.79	0.00	2.00	2.00	0.00
H-3	17.56	14.06	3.50	0.00	1.15	3.00	0.00	3.00
K-1	15.98	14.57	1.41	0.00	1.19	4.00	0.00	4.00
M10	16.25	17.49	-1.24	-1.24	0.00	5.00	5.00	0.00
S-3	16.44	14.33	2.11	0.00	1.25	6.00	0.00	6.00
G-3	21.87	14.52	7.35	0.00	1.41	7.00	0.00	7.00
H-4	16.35	15.10	1.25	-1.47	0.00	8.00	8.00	0.00
R-3	21.53	15.33	6.20	0.00	2.11	9.00	0.00	9.00
F-3	16.11	14.92	1.19	-2.25	0.00	10.00	10.00	0.00
F-4	15.66	16.45	-0.79	-2.38	0.00	11.00	11.00	0.00
H-5	15.73	17.20	-1.47	0.00	2.44	12.00	0.00	12.00
M13	16.55	14.11	2.44	0.00	2.62	13.00	0.00	13.00
R-2	15.32	14.86	0.46	0.00	3.50	14.00	0.00	14.00
P-3	20.91	13.88	7.03	0.00	6.20	15.00	0.00	15.00
M11	16.84	15.69	1.15	0.00	7.03	16.00	0.00	16.00
F-2	16.31	18.56	-2.25	0.00	7.35	17.00	0.00	17.00

**MEAN A: 17.22      STD DEV A: 2.20      SUM OF N MINUS: 36.00 -----  
MEAN B: 15.54      STD DEV B: 1.38      SUM OF N PLUS : ----- 117.00**

**\*\*\* SIGNIFICANT DIFFERENCE \*\*\***

**WILCOXON ANALYSIS**

**ANALYSIS OF: CHEST RES**

**FUNCTION A = G: 10**

**CELL: G  
CELL: L**

**ABS  
ABS**

SUBJ	A VAL	B VAL	A-B	GRO -	GRO +	N	N -	N +
D-1	14.99	17.27	-2.28	0.00	0.39	1.00	0.00	1.00
M-2	18.75	16.21	2.54	-0.59	0.00	2.00	2.00	0.00
H-3	17.98	14.57	3.41	-1.05	0.00	3.00	3.00	0.00
K-1	16.43	14.96	1.47	0.00	1.08	4.00	0.00	4.00
M10	16.63	17.68	-1.05	0.00	1.24	5.00	0.00	5.00
S-3	16.87	14.99	1.88	0.00	1.30	6.00	0.00	6.00
G-3	22.06	14.97	7.09	0.00	1.47	7.00	0.00	7.00
H-4	18.55	15.31	1.24	-1.68	0.00	8.00	8.00	0.00
R-3	21.72	15.47	6.25	0.00	1.88	9.00	0.00	9.00
F-3	16.19	15.11	1.08	0.00	2.20	10.00	0.00	10.00
F-4	16.17	16.76	-0.59	-2.28	0.00	11.00	11.00	0.00
H-5	15.78	17.46	-1.68	-2.36	0.00	12.00	12.00	0.00
M13	16.69	14.49	2.20	0.00	2.54	13.00	0.00	13.00
R-2	15.53	15.14	0.39	0.00	3.41	14.00	0.00	14.00
P-3	21.07	14.18	6.89	0.00	6.25	15.00	0.00	15.00
M11	17.20	15.90	1.30	0.00	6.89	16.00	0.00	16.00
F-2	16.57	18.93	-2.36	0.00	7.09	17.00	0.00	17.00

**MEAN A: 17.48      STD. DEV A: 2.16      SUM OF N MINUS: 36.00 -----  
MEAN B: 15.85      STD DEV B: 1.33      SUM OF N PLUS : ----- 117.00**

**\*\*\* SIGNIFICANT DIFFERENCE \*\*\***

**WILCOXON ANALYSIS**

**ANALYSIS OF: CHEST SI**

**FUNCTION A = G: 10**

**CELL: G**

**MAX**

**FUNCTION B = G: 10**

**CELL: L**

**MAX**

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	30.77	33.61	-2.84	-0.07	0.00	1.00	1.00	0.00
M-2	32.05	31.65	0.40	0.00	0.40	2.00	0.00	2.00
H-3	36.85	27.71	9.14	0.00	0.58	3.00	0.00	3.00
K-1	35.31	26.80	8.51	0.00	1.46	4.00	0.00	4.00
M10	31.63	33.13	-1.50	-1.50	0.00	5.00	5.00	0.00
S-3	30.76	26.69	4.07	0.00	2.48	6.00	0.00	6.00
G-3	42.59	26.06	16.53	-2.84	0.00	7.00	7.00	0.00
H-4	28.27	25.79	2.48	0.00	3.36	8.00	0.00	8.00
R-3	35.67	26.51	9.16	0.00	3.70	9.00	0.00	9.00
F-3	28.36	27.78	0.58	0.00	4.07	10.00	0.00	10.00
F-4	29.62	28.16	1.46	0.00	5.12	11.00	0.00	11.00
H-5	29.33	25.97	3.36	0.00	7.05	12.00	0.00	12.00
M13	29.09	25.39	3.70	0.00	8.51	13.00	0.00	13.00
R-2	28.41	23.29	5.12	0.00	9.14	14.00	0.00	14.00
P-3	36.78	23.34	13.44	0.00	9.16	15.00	0.00	15.00
M11	35.47	28.42	7.05	0.00	13.44	16.00	0.00	16.00
F-2	36.38	36.45	-0.07	0.00	16.53	17.00	0.00	17.00

**MEAN A:** 32.78

**STD DEV A:** 4.09

**SUM OF N MINUS:** 13.00

**MEAN B:** 28.04

**STD DEV B:** 3.64

**SUM OF N PLUS :** 140.00

**\*\*\* SIGNIFICANT DIFFERENCE \*\*\***

**WILCOXON ANALYSIS**

**ANALYSIS OF: HEAD X**

**FUNCTION A = G: 10**

**CELL: G**

**MAX**

**FUNCTION B = G: 10**

**CELL: L**

**MAX**

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	2.56	2.47	0.09	0.00	0.03	1.00	0.00	1.00
M-2	1.12	3.55	-2.43	0.00	0.09	2.00	0.00	2.00
H-3	3.05	0.55	2.50	-0.11	0.00	3.00	3.00	0.00
K-1	1.43	0.36	1.07	0.00	0.17	4.00	0.00	4.00
M10	1.61	1.44	0.17	0.00	0.25	5.00	0.00	5.00
S-3	2.09	0.69	1.40	0.00	0.35	6.00	0.00	6.00
G-3	2.26	0.40	1.86	-0.90	0.00	7.00	7.00	0.00
H-4	3.96	2.29	1.67	0.00	0.94	8.00	0.00	8.00
R-3	0.98	0.73	0.25	0.00	1.07	9.00	0.00	9.00
F-3	0.83	1.73	-0.90	0.00	1.27	10.00	0.00	10.00
F-4	0.94	0.91	0.03	0.00	1.40	11.00	0.00	11.00
H-5	2.53	0.48	2.05	0.00	1.47	12.00	0.00	12.00
M13	1.60	0.33	1.27	0.00	1.67	13.00	0.00	13.00
R-2	0.37	0.48	-0.11	0.00	1.86	14.00	0.00	14.00
P-3	0.92	0.57	0.35	0.00	2.05	15.00	0.00	15.00
M11	1.52	0.58	0.94	-2.43	0.00	16.00	16.00	0.00
F-2	2.74	1.27	1.47	0.00	2.50	17.00	0.00	17.00

**MEAN A:** 1.79

**STD DEV A:** 0.95

**SUM OF N MINUS:** 26.00

**MEAN B:** 1.11

**STD DEV B:** 0.92

**SUM OF N PLUS :** 127.00

**\*\*\* SIGNIFICANT DIFFERENCE \*\*\***

### WILCOXON ANALYSIS

ANALYSIS OF: HEAD SI

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

ABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
O-1	16.77	17.67	-0.90	0.00	0.50	1.00	0.00	1.00
M-2	18.64	15.50	3.14	0.00	0.58	2.00	0.00	2.00
H-3	19.03	16.27	2.76	-0.90	0.00	3.00	3.00	0.00
K-1	16.66	16.08	0.58	0.00	0.90	4.00	0.00	4.00
M10	22.95	18.74	4.21	0.00	1.15	5.00	0.00	5.00
S-3	20.07	16.00	4.07	0.00	1.43	6.00	0.00	6.00
G-3	16.57	18.19	-1.62	-1.62	0.00	7.00	7.00	0.00
H-4	22.65	20.30	2.35	0.00	2.35	8.00	0.00	8.00
R-3	17.40	15.97	1.43	0.00	2.71	9.00	0.00	9.00
F-3	18.92	15.64	3.28	0.00	2.76	10.00	0.00	10.00
F-4	20.90	19.75	1.15	0.00	3.14	11.00	0.00	11.00
H-5	21.82	17.34	4.48	0.00	3.28	12.00	0.00	12.00
M13	18.29	17.39	0.90	0.00	3.60	13.00	0.00	13.00
R-2	21.33	15.98	5.35	0.00	4.07	14.00	0.00	14.00
P-3	19.61	16.01	3.60	0.00	4.21	15.00	0.00	15.00
M11	18.62	15.91	2.71	0.00	4.48	16.00	0.00	16.00
F-2	21.32	20.82	0.50	0.00	5.35	17.00	0.00	17.00

MEAN A: 19.50 STD DEV A: 2.06 SUM OF N MINUS: 10.00 -----  
MEAN B: 17.27 STD DEV B: 1.73 SUM OF N PLUS : ----- 143.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: TOTAL SHLD REEL

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
O-1	85.11	68.87	16.24	0.00	2.01	1.00	0.00	1.00
M-2	69.27	98.28	-29.01	-10.40	0.00	2.00	2.00	0.00
H-3	113.38	90.45	22.95	-12.29	0.00	3.00	3.00	0.00
K-1	57.45	55.44	2.01	0.00	12.84	4.00	0.00	4.00
M10	62.54	24.92	37.62	0.00	16.11	5.00	0.00	5.00
S-3	72.82	85.11	-12.29	0.00	16.24	6.00	0.00	6.00
G-3	115.75	69.96	25.79	0.00	17.30	7.00	0.00	7.00
H-4	72.39	59.55	12.84	0.00	19.56	8.00	0.00	8.00
R-3	78.49	88.89	-10.40	0.00	22.95	9.00	0.00	9.00
F-3	110.45	71.87	38.58	0.00	25.79	10.00	0.00	10.00
F-4	43.20	70.35	-27.15	-27.15	0.00	11.00	11.00	0.00
M-5	114.10	58.73	55.37	-29.01	0.00	12.00	12.00	0.00
M13	83.32	34.27	49.05	0.00	37.62	13.00	0.00	13.00
R-2	59.15	43.04	16.11	0.00	38.58	14.00	0.00	14.00
P-3	107.85	88.29	19.56	0.00	45.48	15.00	0.00	15.00
M11	62.06	44.76	17.30	0.00	49.05	16.00	0.00	16.00
F-2	62.56	17.18	45.48	0.00	55.37	17.00	0.00	17.00

MEAN A: 80.59 STD DEV A: 23.37 SUM OF N MINUS: 28.00 -----  
MEAN B: 64.11 STD DEV B: 24.83 SUM OF N PLUS : ----- 125.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: TOTAL SHOULDER

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	R-B	ORD -	ORD +	N	N -	N +
D-1	172.02	137.71	34.31	0.00	4.85	1.00	0.00	1.00
M-2	121.85	151.67	-29.82	-5.43	0.00	2.00	2.00	0.00
H-3	178.60	147.84	30.76	-7.42	0.00	3.00	3.00	0.00
K-1	109.17	104.32	4.85	0.00	9.14	4.00	0.00	4.00
M10	106.31	55.86	50.45	-15.68	0.00	5.00	5.00	0.00
S-3	123.68	129.11	-5.43	0.00	22.77	6.00	0.00	6.00
G-3	184.29	151.98	32.31	-23.17	0.00	7.00	7.00	0.00
H-4	121.80	137.48	-15.68	-29.82	0.00	8.00	8.00	0.00
R-3	142.36	165.53	-23.17	0.00	30.76	9.00	0.00	9.00
F-3	185.90	119.05	66.85	0.00	32.31	10.00	0.00	10.00
F-4	106.55	158.08	-51.53	0.00	34.31	11.00	0.00	11.00
H-5	181.18	119.75	61.43	0.00	50.45	12.00	0.00	12.00
M13	144.84	72.47	72.37	-51.53	0.00	13.00	13.00	0.00
R-2	108.69	116.11	-7.42	0.00	61.43	14.00	0.00	14.00
P-3	184.03	161.26	22.77	0.00	61.55	15.00	0.00	15.00
M11	107.22	98.08	9.14	0.00	66.85	16.00	0.00	16.00
F-2	116.39	54.84	61.55	0.00	72.37	17.00	0.00	17.00

MEAN A: 140.88 STD DEV A: 32.57 SUM OF N MINUS: 38.00 -----  
MEAN B: 122.42 STD DEV B: 35.35 SUM OF N PLUS : ----- 115.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: TOTAL LAP

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	R-B	ORD -	ORD +	N	N -	N +
D-1	97.05	118.34	-21.29	-1.18	0.00	1.00	1.00	0.00
M-2	69.81	119.55	-49.74	-2.03	0.00	2.00	2.00	0.00
H-3	89.02	112.54	-23.52	0.00	3.49	3.00	0.00	3.00
K-1	73.62	121.28	-47.66	-3.53	0.00	4.00	4.00	0.00
M10	67.60	76.99	-9.39	-7.73	0.00	5.00	5.00	0.00
S-3	68.63	96.57	-27.94	-9.39	0.00	6.00	6.00	0.00
G-3	120.59	100.22	20.37	-14.46	0.00	7.00	7.00	0.00
H-4	112.21	92.88	19.33	0.00	19.33	8.00	0.00	8.00
R-3	107.31	115.04	-7.73	0.00	20.37	9.00	0.00	9.00
F-3	93.54	119.00	-25.46	-21.29	0.00	10.00	10.00	0.00
F-4	63.65	100.40	-36.75	0.00	21.69	11.00	0.00	11.00
H-5	87.04	83.55	3.49	-23.52	0.00	12.00	12.00	0.00
M13	84.98	87.01	-2.03	-25.46	0.00	13.00	13.00	0.00
R-2	63.00	97.46	-14.46	-27.94	0.00	14.00	14.00	0.00
P-3	167.99	146.30	21.69	-36.75	0.00	15.00	15.00	0.00
M11	68.24	71.77	-3.53	-47.66	0.00	16.00	16.00	0.00
F-2	99.35	100.53	-1.18	-49.74	0.00	17.00	17.00	0.00

MEAN A: 91.39 STD DEV A: 26.00 SUM OF N MINUS: 122.00 -----  
MEAN B: 103.50 STD DEV B: 18.85 SUM OF N PLUS : ----- 31.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

#### ANALYSIS OF: CROTCH STRAP

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	303.89	238.52	65.37	-2.06	0.00	1.00	1.00	0.00
M-2	105.62	65.13	40.49	0.00	5.73	2.00	0.00	2.00
H-3	136.90	156.56	-19.66	-10.52	0.00	3.00	3.00	0.00
K-1	144.67	121.74	22.93	0.00	16.72	4.00	0.00	4.00
M10	82.79	66.07	16.72	-19.66	0.00	5.00	5.00	0.00
S-3	109.23	119.75	-10.52	0.00	21.05	6.00	0.00	6.00
G-3	46.17	84.32	-38.15	0.00	22.93	7.00	0.00	7.00
H-4	113.95	236.02	-122.07	-34.77	0.00	8.00	8.00	0.00
R-3	89.21	129.14	-39.93	-38.15	0.00	9.00	9.00	0.00
F-3	144.89	146.95	-2.06	-39.93	0.00	10.00	10.00	0.00
F-4	93.94	148.78	-54.84	0.00	40.49	11.00	0.00	11.00
H-5	74.30	109.07	-34.77	-41.38	0.00	12.00	12.00	0.00
M13	119.85	114.12	5.73	-54.84	0.00	13.00	13.00	0.00
R-2	65.80	128.70	-62.90	-62.90	0.00	14.00	14.00	0.00
P-3	173.09	248.35	-75.26	0.00	65.37	15.00	0.00	15.00
M11	118.66	160.04	-41.38	-75.26	0.00	16.00	16.00	0.00
F-2	120.59	99.54	21.05	-122.07	0.00	17.00	17.00	0.00

MEAN A: 120.21 STD DEV A: 57.01 SUM OF N MINUS: 108.00 -----  
MEAN B: 139.58 STD DEV B: 55.84 SUM OF N PLUS : 45.00

### WILCOXON ANALYSIS

#### ANALYSIS OF: TOTAL SEAT X

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MIN  
MIN

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	-287.82	-245.00	-42.82	0.00	2.39	1.00	0.00	1.00
M-2	-308.50	-254.11	-54.39	-5.47	0.00	2.00	2.00	0.00
H-3	-267.21	-261.26	-5.95	-5.95	0.00	3.00	3.00	0.00
K-1	-316.57	-280.52	-36.05	-8.62	0.00	4.00	4.00	0.00
M10	-273.76	-249.61	-24.15	-22.88	0.00	5.00	5.00	0.00
S-3	-297.89	-255.46	-42.43	-24.15	0.00	6.00	6.00	0.00
G-3	-263.07	-293.40	30.33	0.00	30.33	7.00	0.00	7.00
H-4	-281.51	-272.89	-8.62	0.00	31.68	8.00	0.00	8.00
R-3	-227.94	-205.06	-22.88	-33.82	0.00	9.00	9.00	0.00
F-3	-233.16	-227.69	-5.47	-35.81	0.00	10.00	10.00	0.00
F-4	-338.39	-302.58	-35.81	-36.05	0.00	11.00	11.00	0.00
H-5	-209.23	-142.48	-66.75	-42.43	0.00	12.00	12.00	0.00
M13	-297.66	-329.34	31.68	-42.82	0.00	13.00	13.00	0.00
R-2	-179.24	-69.89	-109.35	-54.39	0.00	14.00	14.00	0.00
P-3	-313.52	-244.57	-68.95	-66.75	0.00	15.00	15.00	0.00
M11	-340.70	-343.09	2.39	-68.95	0.00	16.00	16.00	0.00
F-2	-399.88	-366.06	-33.82	-109.35	0.00	17.00	17.00	0.00

MEAN A: -284.47 STD DEV A: 53.41 SUM OF N MINUS: 137.00 -----  
MEAN B: -255.47 STD DEV B: 71.05 SUM OF N PLUS : 16.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: TOTAL SEAT Z

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	2194.61	2169.48	5.13	0.00	3.85	1.00	0.00	1.00
M-2	1749.54	1671.43	78.11	0.00	5.13	2.00	0.00	2.00
H-3	1808.15	1714.64	93.51	-25.10	0.00	3.00	3.00	0.00
K-1	2158.72	2020.40	138.32	-29.62	0.00	4.00	4.00	0.00
M10	1586.88	1547.98	38.90	0.00	36.87	5.00	0.00	5.00
S-3	1897.34	1731.82	165.52	0.00	38.90	6.00	0.00	6.00
G-3	1778.35	1741.48	36.87	0.00	41.50	7.00	0.00	7.00
H-4	1875.79	1871.94	3.85	0.00	54.69	8.00	0.00	8.00
R-3	1657.26	1591.17	66.09	0.00	60.29	9.00	0.00	9.00
F-3	1572.26	1397.61	174.65	0.00	66.09	10.00	0.00	10.00
F-4	1583.82	1608.92	-25.10	0.00	78.11	11.00	0.00	11.00
H-5	1434.31	1379.62	54.69	0.00	93.51	12.00	0.00	12.00
M13	1716.38	1746.00	-29.62	0.00	120.25	13.00	0.00	13.00
R-2	1621.90	1501.65	120.25	0.00	124.42	14.00	0.00	14.00
P-3	2158.39	2033.97	124.42	0.00	138.32	15.00	0.00	15.00
M11	1735.34	1675.05	60.29	0.00	165.52	16.00	0.00	16.00
F-2	1581.65	1540.15	41.50	0.00	174.65	17.00	0.00	17.00

MEAN A: 1771.22 STD DEV A: 224.41 SUM OF N MINUS: 7.00 -----  
MEAN B: 1703.72 STD DEV B: 222.46 SUM OF N PLUS : ----- 146.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: RES SEAT FORCE

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
O-1	2213.44	2204.83	8.61	0.00	3.58	1.00	0.00	1.00
M-2	1776.34	1691.12	85.22	0.00	8.61	2.00	0.00	2.00
H-3	1827.47	1735.11	92.36	-19.96	0.00	3.00	3.00	0.00
K-1	2182.88	2044.38	138.50	0.00	30.64	4.00	0.00	4.00
M10	1609.17	1567.77	41.40	-34.86	0.00	5.00	5.00	0.00
S-3	1923.01	1752.20	170.81	0.00	41.40	6.00	0.00	6.00
G-3	1797.70	1767.06	30.64	0.00	44.65	7.00	0.00	7.00
H-4	1896.95	1893.37	3.58	0.00	57.34	8.00	0.00	8.00
R-3	1672.95	1605.24	67.71	0.00	60.72	9.00	0.00	9.00
F-3	1509.22	1417.52	171.70	0.00	67.71	10.00	0.00	10.00
F-4	1621.16	1641.12	-19.96	0.00	85.22	11.00	0.00	11.00
H-5	1447.76	1387.04	60.72	0.00	92.36	12.00	0.00	12.00
M13	1743.29	1778.15	-34.86	0.00	127.17	13.00	0.00	13.00
R-2	1630.49	1503.32	127.17	0.00	131.25	14.00	0.00	14.00
P-3	2180.35	2049.10	131.25	0.00	138.50	15.00	0.00	15.00
M11	1767.23	1709.89	57.34	0.00	170.81	16.00	0.00	16.00
F-2	1633.39	1598.74	44.65	0.00	171.70	17.00	0.00	17.00

MEAN A: 1794.87 STD DEV A: 223.80 SUM OF N MINUS: 8.00 -----  
MEAN B: 1725.64 STD DEV B: 222.91 SUM OF N PLUS : ----- 145.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: TOTAL FOOT X

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

MIN  
MIN

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	-580.27	-696.19	115.92	0.00	14.14	1.00	0.00	1.00
M-2	-375.88	-468.06	92.18	0.00	79.69	2.00	0.00	2.00
H-3	-434.90	-564.62	129.72	0.00	92.18	3.00	0.00	3.00
K-1	-249.91	-403.99	154.08	0.00	99.70	4.00	0.00	4.00
M10	-376.39	-476.09	99.70	0.00	115.92	5.00	0.00	5.00
S-3	-355.24	-471.37	116.13	0.00	116.13	6.00	0.00	6.00
G-3	-305.25	-468.51	163.26	0.00	118.12	7.00	0.00	7.00
H-4	-590.72	-708.84	118.12	0.00	129.72	8.00	0.00	8.00
R-3	-305.55	-471.14	165.59	0.00	130.86	9.00	0.00	9.00
F-3	-558.37	-730.81	172.44	0.00	154.08	10.00	0.00	10.00
F-4	-333.12	-347.26	14.14	0.00	157.69	11.00	0.00	11.00
H-5	-414.75	-572.44	157.69	0.00	163.26	12.00	0.00	12.00
M13	-367.29	-498.15	130.86	0.00	165.59	13.00	0.00	13.00
R-2	-417.13	-616.66	199.53	0.00	172.44	14.00	0.00	14.00
P-3	-475.41	-690.63	215.22	0.00	195.50	15.00	0.00	15.00
M11	-346.81	-542.31	195.50	0.00	199.53	16.00	0.00	16.00
F-2	-349.93	-429.62	79.69	0.00	215.22	17.00	0.00	17.00

MEAN A: -402.17 STD DEV A: 98.66 SUM OF N MINUS: 0.00 -----  
MEAN B: -538.63 STD DEV B: 115.36 SUM OF N PLUS : ----- 153.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

ANALYSIS OF: RES FOOT FORCE

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: G  
CELL: L

ABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
D-1	793.02	917.10	-184.08	0.00	23.87	1.00	0.00	1.00
M-2	574.03	667.28	-93.25	0.00	50.78	2.00	0.00	2.00
H-3	672.39	621.61	50.78	-54.23	0.00	3.00	3.00	0.00
K-1	398.06	548.16	-150.10	-85.59	0.00	4.00	4.00	0.00
M10	472.25	598.74	-126.49	-93.25	0.00	5.00	5.00	0.00
S-3	585.10	639.33	-54.23	-124.36	0.00	6.00	6.00	0.00
G-3	471.78	635.96	-164.18	-126.49	0.00	7.00	7.00	0.00
H-4	753.35	892.57	-139.22	-139.22	0.00	8.00	8.00	0.00
R-3	404.62	588.81	-184.19	-140.11	0.00	9.00	9.00	0.00
F-3	679.80	870.92	-191.12	-150.10	0.00	10.00	10.00	0.00
F-4	506.65	482.78	23.87	-164.18	0.00	11.00	11.00	0.00
H-5	595.09	719.45	-124.36	-179.55	0.00	12.00	12.00	0.00
M13	548.31	688.42	-140.11	-184.08	0.00	13.00	13.00	0.00
R-2	620.89	919.46	-298.63	-184.19	0.00	14.00	14.00	0.00
P-3	701.91	881.46	-179.55	-187.20	0.00	15.00	15.00	0.00
M11	509.86	697.06	-187.20	-191.12	0.00	16.00	16.00	0.00
F-2	592.61	678.20	-85.59	-298.63	0.00	17.00	17.00	0.00

MEAN A: 577.63 STD DEV A: 108.20 SUM OF N MINUS: 150.00 -----  
MEAN B: 708.67 STD DEV B: 137.41 SUM OF N PLUS : ----- 3.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: HEAD Z**

SUBJ	A VAL	B VAL	A-B	ORD		N	N -	N +
				-	+			
M10	12.72	10.80	1.92	0.00	0.35	1.00	0.00	1.00
H-3	11.28	10.51	0.77	0.00	0.69	2.00	0.00	2.00
M13	13.13	11.20	1.93	0.00	0.77	3.00	0.00	3.00
R-2	12.30	9.81	2.49	0.00	0.80	4.00	0.00	4.00
F-3	11.30	10.61	0.69	0.00	0.98	5.00	0.00	5.00
H-5	12.14	11.34	0.80	0.00	0.98	6.00	0.00	6.00
M11	12.07	10.54	1.53	0.00	1.28	7.00	0.00	7.00
F-4	13.60	13.25	0.35	0.00	1.53	8.00	0.00	8.00
P-3	11.55	10.27	1.28	0.00	1.92	9.00	0.00	9.00
S-3	12.69	11.71	0.98	0.00	1.93	10.00	0.00	10.00
F-2	13.56	12.58	0.98	0.00	2.49	11.00	0.00	11.00

MEAN A: 12.39 STD DEV A: 0.83 SUM OF N MINUS: 0.00 -----  
 MEAN B: 11.15 STD DEV B: 1.03 SUM OF N PLUS : ----- 66.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: HEAD RES**

SUBJ	A VAL	B VAL	A-B	ORD		N	N -	N +
				-	+			
M10	12.93	11.09	1.84	0.00	0.21	1.00	0.00	1.00
H-3	11.43	11.22	0.21	0.00	0.35	2.00	0.00	2.00
M13	13.19	11.31	1.88	0.00	0.79	3.00	0.00	3.00
R-2	12.39	10.89	1.50	0.00	0.84	4.00	0.00	4.00
F-3	11.42	10.63	0.79	0.00	0.85	5.00	0.00	5.00
H-5	12.28	11.44	0.84	0.00	0.97	6.00	0.00	6.00
M11	12.20	10.72	1.48	0.00	1.31	7.00	0.00	7.00
F-4	13.62	13.27	0.35	0.00	1.48	8.00	0.00	8.00
P-3	11.72	10.41	1.31	0.00	1.50	9.00	0.00	9.00
S-3	12.84	11.87	0.97	0.00	1.84	10.00	0.00	10.00
F-2	13.61	12.76	0.85	0.00	1.86	11.00	0.00	11.00

MEAN A: 12.51 STD DEV A: 0.80 SUM OF N MINUS: 0.00 -----  
 MEAN B: 11.42 STD DEV B: 0.89 SUM OF N PLUS : ----- 66.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: HEAD SI

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

ABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	18.74	15.44	3.30	0.00	0.08	1.00	0.00	1.00
H-3	16.27	16.02	0.25	0.00	0.25	2.00	0.00	2.00
M13	17.39	15.69	1.70	0.00	0.26	3.00	0.00	3.00
R-2	15.98	15.72	0.26	0.00	1.00	4.00	0.00	4.00
F-3	15.64	14.27	1.37	-1.15	0.00	5.00	5.00	0.00
H-5	17.34	16.34	1.00	0.00	1.37	6.00	0.00	6.00
M11	15.91	15.83	0.08	0.00	1.70	7.00	0.00	7.00
F-4	19.75	18.05	1.70	0.00	1.70	8.00	0.00	8.00
P-3	16.01	13.78	2.23	0.00	2.23	9.00	0.00	9.00
S-3	16.00	17.15	-1.15	0.00	3.12	10.00	0.00	10.00
F-2	20.82	17.70	3.12	0.00	3.30	11.00	0.00	11.00

MEAN A: 17.26 STD DEV A: 1.77 SUM OF N MINUS: 5.00 -----  
MEAN B: 16.00 STD DEV B: 1.30 SUM OF N PLUS : ----- 61.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: TOTAL SHLD REFL

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	37.74	88.21	-50.47	-9.24	0.00	1.00	1.00	0.00
H-3	68.98	122.87	-53.89	-10.32	0.00	2.00	2.00	0.00
M13	48.42	100.21	-51.79	0.00	11.94	3.00	0.00	3.00
R-2	82.35	70.41	11.94	-26.41	0.00	4.00	4.00	0.00
F-3	65.21	157.97	-92.76	-30.90	0.00	5.00	5.00	0.00
H-5	73.27	99.68	-26.41	-49.06	0.00	6.00	6.00	0.00
M11	87.48	77.80	-10.32	-50.47	0.00	7.00	7.00	0.00
F-4	94.36	103.60	-9.24	-51.79	0.00	8.00	8.00	0.00
P-3	117.99	167.05	-49.06	-53.89	0.00	9.00	9.00	0.00
S-3	87.33	98.23	-30.90	-61.11	0.00	10.00	10.00	0.00
F-2	38.56	99.67	-61.11	-92.76	0.00	11.00	11.00	0.00

MEAN A: 69.24 STD DEV A: 23.63 SUM OF N MINUS: 63.00 -----  
MEAN B: 107.79 STD DEV B: 30.39 SUM OF N PLUS : ----- 3.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: TOTAL SHLD REEL**

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	24.92	154.70	-129.78	-102.69	0.00	1.00	1.00	0.00
H-3	90.43	244.37	-153.94	-129.78	0.00	2.00	2.00	0.00
M13	34.27	239.46	-205.19	-132.92	0.00	3.00	3.00	0.00
R-2	43.04	145.73	-102.69	-150.55	0.00	4.00	4.00	0.00
F-3	71.87	254.00	-182.13	-153.94	0.00	5.00	5.00	0.00
H-5	58.73	220.86	-162.13	-159.29	0.00	6.00	6.00	0.00
M11	44.76	177.68	-132.92	-160.46	0.00	7.00	7.00	0.00
F-4	70.35	230.81	-160.46	-162.13	0.00	8.00	8.00	0.00
P-3	88.29	247.58	-153.29	-169.53	0.00	9.00	9.00	0.00
S-3	85.11	235.66	-150.55	-182.13	0.00	10.00	10.00	0.00
F-2	17.18	186.71	-169.53	-205.19	0.00	11.00	11.00	0.00

MEAN A: 57.18 STO DEV A: 26.01 SUM OF N MINUS: 66.00 -----  
MEAN B: 212.51 STO DEV B: 39.13 SUM OF N PLUS : ----- 0.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: TOTAL SHOULDER**

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	55.86	221.02	-165.16	-78.34	0.00	1.00	1.00	0.00
H-3	147.84	346.36	-198.52	-122.68	0.00	2.00	2.00	0.00
M13	72.47	297.83	-225.36	-130.84	0.00	3.00	3.00	0.00
R-2	115.11	194.45	-78.34	-165.16	0.00	4.00	4.00	0.00
F-3	119.05	336.36	-217.31	-185.12	0.00	5.00	5.00	0.00
H-5	119.75	310.55	-190.80	-190.80	0.00	6.00	6.00	0.00
M11	98.08	220.96	-122.88	-194.97	0.00	7.00	7.00	0.00
F-4	158.08	288.92	-130.84	-198.52	0.00	8.00	8.00	0.00
P-3	161.26	356.23	-194.97	-201.97	0.00	9.00	9.00	0.00
S-3	129.11	314.23	-185.12	-217.31	0.00	10.00	10.00	0.00
F-2	54.84	256.81	-201.97	-225.36	0.00	11.00	11.00	0.00

MEAN A: 112.04 STO DEV A: 37.99 SUM OF N MINUS: 66.00 -----  
MEAN B: 285.79 STO DEV B: 55.09 SUM OF N PLUS : ----- 0.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: TOTAL LAP

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	76.99	73.36	3.63	0.00	3.63	1.00	0.00	1.00
H-3	112.54	99.09	13.45	0.00	4.17	2.00	0.00	2.00
M13	87.01	82.84	4.17	-4.81	0.00	3.00	3.00	0.00
R-2	97.46	62.98	34.48	0.00	5.72	4.00	0.00	4.00
F-3	119.00	103.61	15.39	0.00	10.51	5.00	0.00	5.00
H-5	83.55	77.83	5.72	0.00	12.78	6.00	0.00	6.00
M11	71.77	76.58	-4.81	0.00	13.45	7.00	0.00	7.00
F-4	100.40	65.40	35.00	0.00	15.39	8.00	0.00	8.00
P-3	146.30	135.79	10.51	0.00	18.28	9.00	0.00	9.00
S-3	96.57	78.29	18.28	0.00	34.48	10.00	0.00	10.00
F-2	100.53	87.75	12.78	0.00	35.00	11.00	0.00	11.00

MEAN A: 99.28 STD DEV A: 21.07 SUM OF N MINUS: 3.00 -----  
MEAN B: 85.77 STD DEV B: 20.74 SUM OF N PLUS : ----- 63.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: CROTCH STRAP

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	66.07	69.42	-3.35	-3.35	0.00	1.00	1.00	0.00
H-3	156.56	84.82	71.74	0.00	5.35	2.00	0.00	2.00
M13	114.12	94.16	19.96	-12.12	0.00	3.00	3.00	0.00
R-2	126.70	68.49	60.21	0.00	19.96	4.00	0.00	4.00
F-3	146.95	72.51	74.44	0.00	60.21	5.00	0.00	5.00
H-5	109.07	121.19	-12.12	0.00	62.07	6.00	0.00	6.00
M11	160.04	94.41	65.63	0.00	65.63	7.00	0.00	7.00
F-4	148.78	86.71	62.07	0.00	71.74	8.00	0.00	8.00
P-3	248.35	165.01	83.34	0.00	73.29	9.00	0.00	9.00
S-3	119.75	46.46	73.29	0.00	74.44	10.00	0.00	10.00
F-2	99.54	94.19	5.35	0.00	83.34	11.00	0.00	11.00

MEAN A: 136.18 STD DEV A: 46.53 SUM OF N MINUS: 4.00 -----  
MEAN B: 90.67 STD DEV B: 31.26 SUM OF N PLUS : ----- 62.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

**WILCOXON ANALYSIS**

**ANALYSIS OF: TOTAL SEAT Z**

**FUNCTION A = G: 10**

**CELL: L**

**FUNCTION B = G: 10**

**CELL: K**

**MAX  
MAX**

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	1547.98	1548.81	-0.83	-0.83	0.00	1.00	1.00	0.00
H-3	1714.64	1801.37	-86.73	-29.17	0.00	2.00	2.00	0.00
M13	1746.00	1825.69	-79.69	-36.63	0.00	3.00	3.00	0.00
R-2	1501.65	1530.82	-29.17	-49.91	0.00	4.00	4.00	0.00
F-3	1397.61	1582.19	-184.58	-79.69	0.00	5.00	5.00	0.00
H-5	1379.62	1466.82	-87.20	-85.87	0.00	6.00	6.00	0.00
M11	1675.05	1724.96	-49.91	-86.73	0.00	7.00	7.00	0.00
F-4	1608.92	1645.55	-36.63	-87.20	0.00	8.00	8.00	0.00
P-3	2033.97	2140.82	-106.85	-103.49	0.00	9.00	9.00	0.00
S-3	1731.82	1835.31	-103.49	-106.85	0.00	10.00	10.00	0.00
F-2	1540.15	1626.02	-85.87	-184.58	0.00	11.00	11.00	0.00

**MEAN A: 1625.22 STD DEV A: 185.57 SUM OF N MINUS: 66.00 -----**

**MEAN B: 1702.58 STD DEV B: 191.68 SUM OF N PLUS : 0.00**

**\*\*\* SIGNIFICANT DIFFERENCE \*\*\***

**WILCOXON ANALYSIS**

**ANALYSIS OF: RES SEAT FORCE**

**FUNCTION A = G: 10**

**CELL: L**

**FUNCTION B = G: 10**

**CELL: K**

**MAX  
MAX**

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	1567.77	1562.00	5.77	0.00	5.77	1.00	0.00	1.00
H-3	1735.11	1824.46	-89.35	-37.09	0.00	2.00	2.00	0.00
M13	1778.15	1848.25	-70.10	-38.20	0.00	3.00	3.00	0.00
R-2	1503.32	1541.52	-38.20	-42.33	0.00	4.00	4.00	0.00
F-3	1417.52	1602.35	-184.83	-70.10	0.00	5.00	5.00	0.00
H-5	1387.04	1480.39	-93.35	-86.51	0.00	6.00	6.00	0.00
M11	1709.89	1752.22	-42.33	-89.35	0.00	7.00	7.00	0.00
F-4	1641.12	1673.21	-37.09	-93.35	0.00	8.00	8.00	0.00
P-3	2049.10	2185.62	-116.52	-113.75	0.00	9.00	9.00	0.00
S-3	1752.20	1865.95	-113.75	-116.52	0.00	10.00	10.00	0.00
F-2	1588.74	1675.25	-86.51	-184.83	0.00	11.00	11.00	0.00

**MEAN A: 1648.18 STD DEV A: 187.68 SUM OF N MINUS: 65.00 -----**

**MEAN B: 1726.93 STD DEV B: 194.83 SUM OF N PLUS : 1.00**

**\*\*\* SIGNIFICANT DIFFERENCE \*\*\***

### WILCOXON ANALYSIS

#### ANALYSIS OF: TOTAL FOOT X

FUN. ION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

MIN  
MIN

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	-476.09	-307.29	-168.80	-76.55	0.00	1.00	1.00	0.00
H-3	-564.62	-381.84	-182.78	-89.24	0.00	2.00	2.00	0.00
M13	-498.15	-421.60	-76.55	-129.35	0.00	3.00	3.00	0.00
R-2	-616.66	-431.27	-185.39	-132.56	0.00	4.00	4.00	0.00
F-3	-730.81	-458.76	-272.05	-156.04	0.00	5.00	5.00	0.00
H-5	-572.44	-407.83	-164.61	-164.61	0.00	6.00	6.00	0.00
M11	-542.31	-386.27	-156.04	-168.80	0.00	7.00	7.00	0.00
F-4	-347.26	-258.02	-89.24	-182.78	0.00	8.00	8.00	0.00
P-3	-690.63	-379.51	-311.12	-185.39	0.00	9.00	9.00	0.00
S-3	-471.37	-342.02	-129.35	-272.05	0.00	10.00	10.00	0.00
F-2	-429.62	-297.06	-132.56	-311.12	0.00	11.00	11.00	0.00

MEAN A: -540.00 STD DEV A: 112.48 SUM OF N MINUS: 66.00 -----  
MEAN B: -370.13 STD DEV B: 62.29 SUM OF N PLUS : ----- 0.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

### WILCOXON ANALYSIS

#### ANALYSIS OF: TOTAL FOOT Z

FUNCTION A = G: 10  
FUNCTION B = G: 10

CELL: L  
CELL: K

MAX  
MAX

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	422.83	333.96	88.87	0.00	56.62	1.00	0.00	1.00
H-3	261.43	438.71	-177.28	0.00	67.58	2.00	0.00	2.00
M13	512.14	444.56	67.58	0.00	71.44	3.00	0.00	3.00
R-2	709.20	368.84	340.36	0.00	82.71	4.00	0.00	4.00
F-3	524.93	375.83	149.10	0.00	88.87	5.00	0.00	5.00
H-5	447.68	332.74	114.94	0.00	114.94	6.00	0.00	6.00
M11	443.05	360.34	82.71	0.00	132.91	7.00	0.00	7.00
F-4	364.04	307.42	56.62	0.00	148.60	8.00	0.00	8.00
P-3	567.86	434.95	132.91	0.00	149.10	9.00	0.00	9.00
S-3	438.76	367.32	71.44	-177.28	0.00	10.00	10.00	0.00
F-2	545.01	396.41	148.60	0.00	340.36	11.00	0.00	11.00

MEAN A: 476.08 STD DEV A: 116.60 SUM OF N MINUS: 10.00 -----  
MEAN B: 378.28 STD DEV B: 46.02 SUM OF N PLUS : ----- 56.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

## WILCOXON ANALYSIS

ANALYSIS OF: RES FOOT FORCE

FUNCTION A = G: 10  
FUNCTION B = G: 10CELL: L  
CELL: KABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
M10	598.74	446.13	152.61	0.00	52.51	1.00	0.00	1.00
H-3	621.61	569.10	52.51	0.00	84.72	2.00	0.00	2.00
M13	688.42	603.70	84.72	0.00	90.84	3.00	0.00	3.00
R-2	919.46	532.23	387.23	0.00	152.61	4.00	0.00	4.00
F-3	870.92	574.80	296.12	0.00	164.97	5.00	0.00	5.00
H-5	719.45	499.40	220.05	0.00	182.12	6.00	0.00	6.00
M11	697.06	514.94	182.12	0.00	192.15	7.00	0.00	7.00
F-4	482.78	391.94	90.84	0.00	220.05	8.00	0.00	8.00
P-3	881.46	565.30	316.16	0.00	296.12	9.00	0.00	9.00
S-3	639.33	474.36	164.97	0.00	316.16	10.00	0.00	10.00
F-2	678.20	486.05	192.15	0.00	387.23	11.00	0.00	11.00

MEAN A: 708.86 STD DEV A: 133.30 SUM OF N MINUS: 0.00 -----  
MEAN B: 514.36 STD DEV B: 63.10 SUM OF N PLUS : ----- 66.00

\*\*\*\* SIGNIFICANT DIFFERENCE \*\*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: Z DISPLACEMENT OF HEAD

FUNCTION A = CELL: G  
FUNCTION B = CELL: K

ABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
S-3	1.73	1.62	0.11	0.00	0.11	1.00	0.00	1.00
M11	1.94	1.35	0.59	0.00	0.14	2.00	0.00	2.00
G-2	2.31	1.72	0.59	0.00	0.21	3.00	0.00	3.00
M10	1.84	1.32	0.52	0.00	0.52	4.00	0.00	4.00
F-2	1.74	1.53	0.21	0.00	0.59	5.00	0.00	5.00
R-2	1.51	1.37	0.14	0.00	0.59	6.00	0.00	6.00
P-3	2.01	1.37	0.64	0.00	0.64	7.00	0.00	7.00

MEAN A: 1.87 STD DEV A: 0.25 SUM OF N MINUS: 0.00 -----  
MEAN B: 1.47 STD DEV B: 0.16 SUM OF N PLUS : ----- 28.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

WILCOXON ANALYSIS

ANALYSIS OF: Z DISPLACEMENT OF HEAD

FUNCTION A = CELL: G  
FUNCTION B = CELL: L

ABS  
ABS

SUBJ	A VAL	B VAL	A-B	ORD -	ORD +	N	N -	N +
S-3	1.73	1.29	0.44	0.00	0.17	1.00	0.00	1.00
K-1	2.06	1.72	0.34	0.00	0.34	2.00	0.00	2.00
M11	1.94	1.54	0.40	0.00	0.35	3.00	0.00	3.00
G-3	2.16	1.99	0.17	0.00	0.40	4.00	0.00	4.00
M10	1.84	1.25	0.59	0.00	0.44	5.00	0.00	5.00
F-2	1.74	1.39	0.35	0.00	0.55	6.00	0.00	6.00
R-2	1.51	0.92	0.59	0.00	0.59	7.00	0.00	7.00
P-3	2.01	1.46	0.55	0.00	0.59	8.00	0.00	8.00

MEAN A: 1.87 STD DEV A: 0.21 SUM OF N MINUS: 0.00 -----  
MEAN B: 1.45 STD DEV B: 0.32 SUM OF N PLUS : ----- 36.00

\*\*\* SIGNIFICANT DIFFERENCE \*\*\*

## APPENDIX D

### SUMMARY OF PHOTOMETRIC DATA

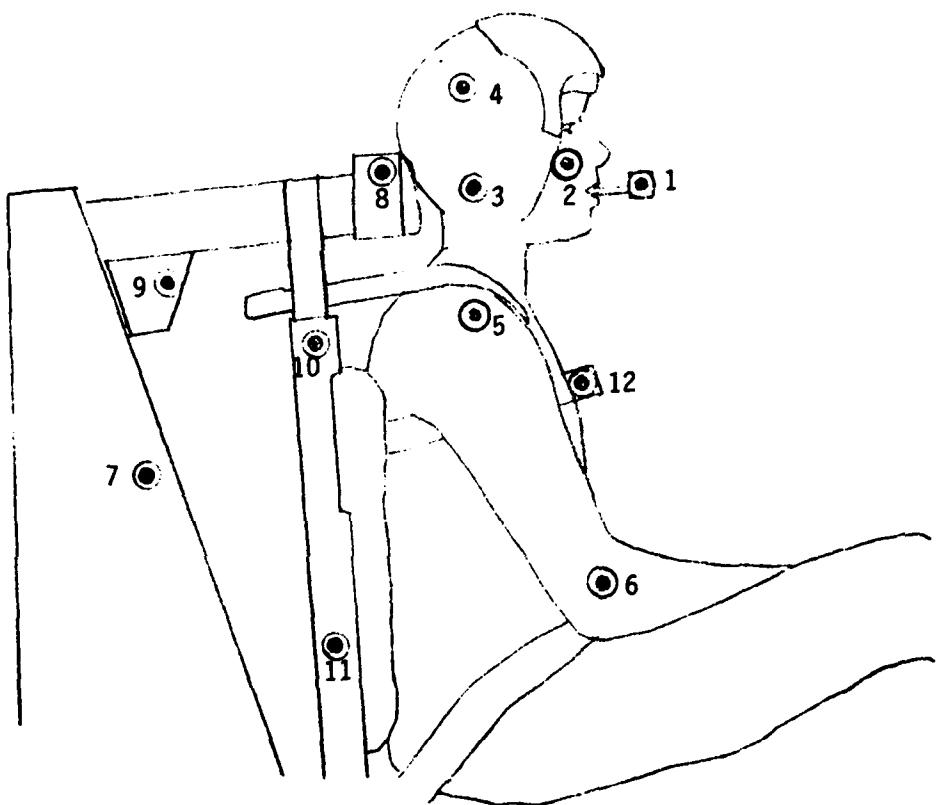
The photometric data obtained from this test program were analyzed to characterize the motions of photometric targets (fiducials) fixed to the test subject and thus describe the subject's dynamic response to impact. Reduction of the film data included digitization of target position information and computer plotting of the position-time, velocity-time, and acceleration-time history of each fiducial.

Fiducials were placed on subjects and the test fixture in accordance with the guidelines provided in "Film Analysis Guide for Dynamic Studies of Test Subjects" (SAE J138, March 1980). The positions of subject-mounted fiducials relative to reference fixture-mounted fiducials were documented for each subject prior to each test. The locations and number designations of each fiducial are shown in Figures D-1, D-2, and D-3. The distance between the "mouth pack" target (Target No. 1 in Figure D-1) and the center of the triaxial accelerometer in the mouth was four inches.

The photometric data were obtained by three 16 mm Milliken cameras, two mounted on the test carriage and one mounted off the carriage. The off-board camera and one on-board camera were positioned to provide a frontal view of the subject and the other on-board camera was positioned to provide a right lateral view of the subject. Each camera lens had a focal length of 10 mm. During the impact, the cameras were operated at 500 frames/sec.

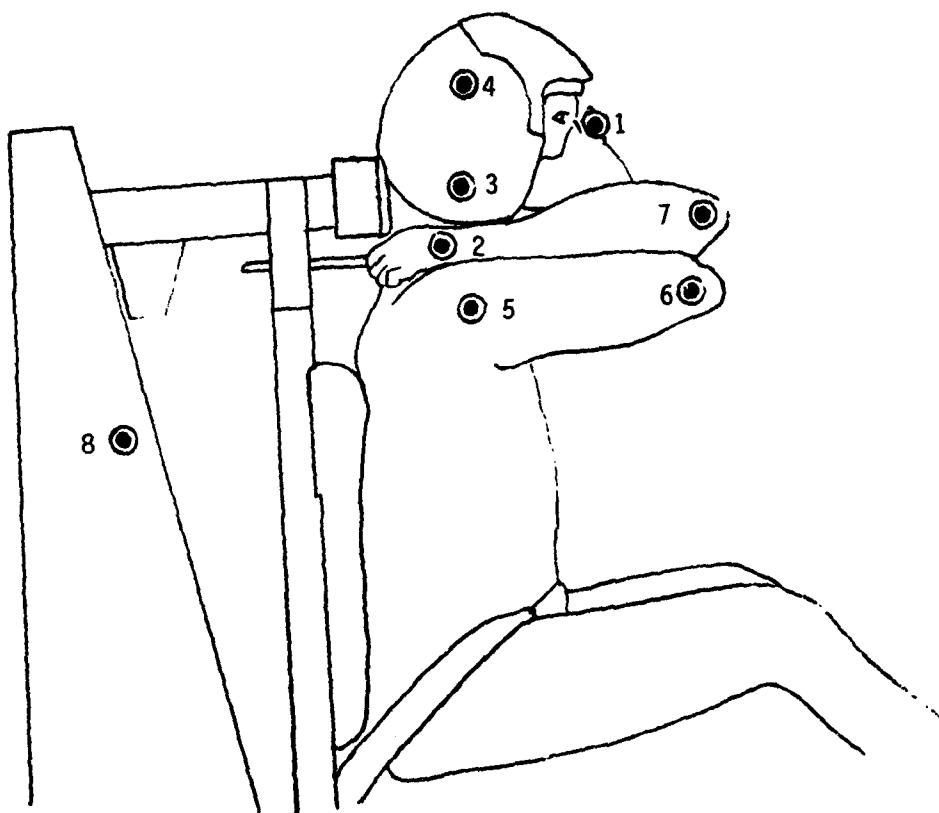
The Photo Digitizing Systems Model 200 processor consists of an Automatic Film Reader (AFR), an electronic scanning camera, and a Data General Corporation (DGC) Nova 3/12 computer. This system was utilized for target position digitization. The semi-automatic AFR is manually initialized by selecting, with a cursor, targets of interest in the first frame of data. Targets on subsequent frames are automatically scanned, acquired, and identified. The target coordinates are then digitized by the Nova computer and the digitized data are then stored on magnetic tape. The coordinate resolution of the AFR is 0.025% of the major film dimension.

These digitized data were then processed on the Control Data Corporation (CDC) Cyber 74 computer system. The computer analysis routine used to process the film data has been described elsewhere (Graf *et al.*, 1978; Brinkley *et al.*, 1981). The program permitted the graphic presentation of position-time, velocity-time, and acceleration-time histories of fiducials and abscissa-ordinate position histories as well. Typical data from each cell of the experimental matrix are presented. The tests selected for presentation correspond to the tests for which analog data are presented in Appendix B.



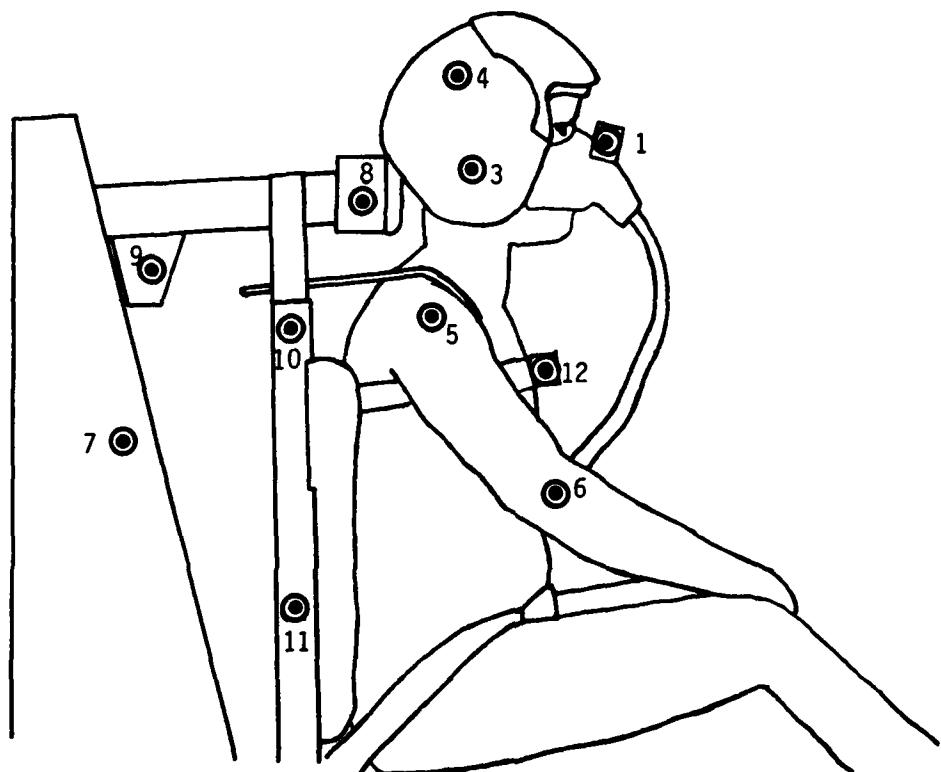
1. Mouthpack
2. Cheek
3. Lower Helmet
4. Upper Helmet
5. Shoulder
6. Elbow
7. Upper Frame
8. Front Head Rest
9. Rear Head Rest
10. Upper Seat Back
11. Lower Seat Back
12. Chest Pack

Figure D-1. Location of Fiducials  
(Hands-in-Lap Position).



1. Mask
2. Left Glove
3. Lower Helmet
4. Upper Helmet
5. Shoulder
6. Right Elbow
7. Left Elbow
8. Upper Frame

Figure D-2. Location of Fiducials  
(Crossed-Arms Position).



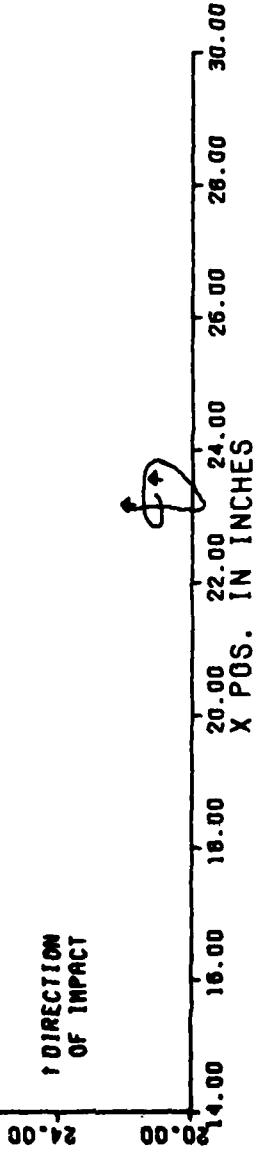
1. Facemask
2. Cheek
3. Lower Helmet
4. Upper Helmet
5. Shoulder
6. Elbow
7. Upper Frame
8. Front Head Rest
9. Rear Head Rest
10. Upper Seat Back
11. Lower Seat Back
12. Chest Pack

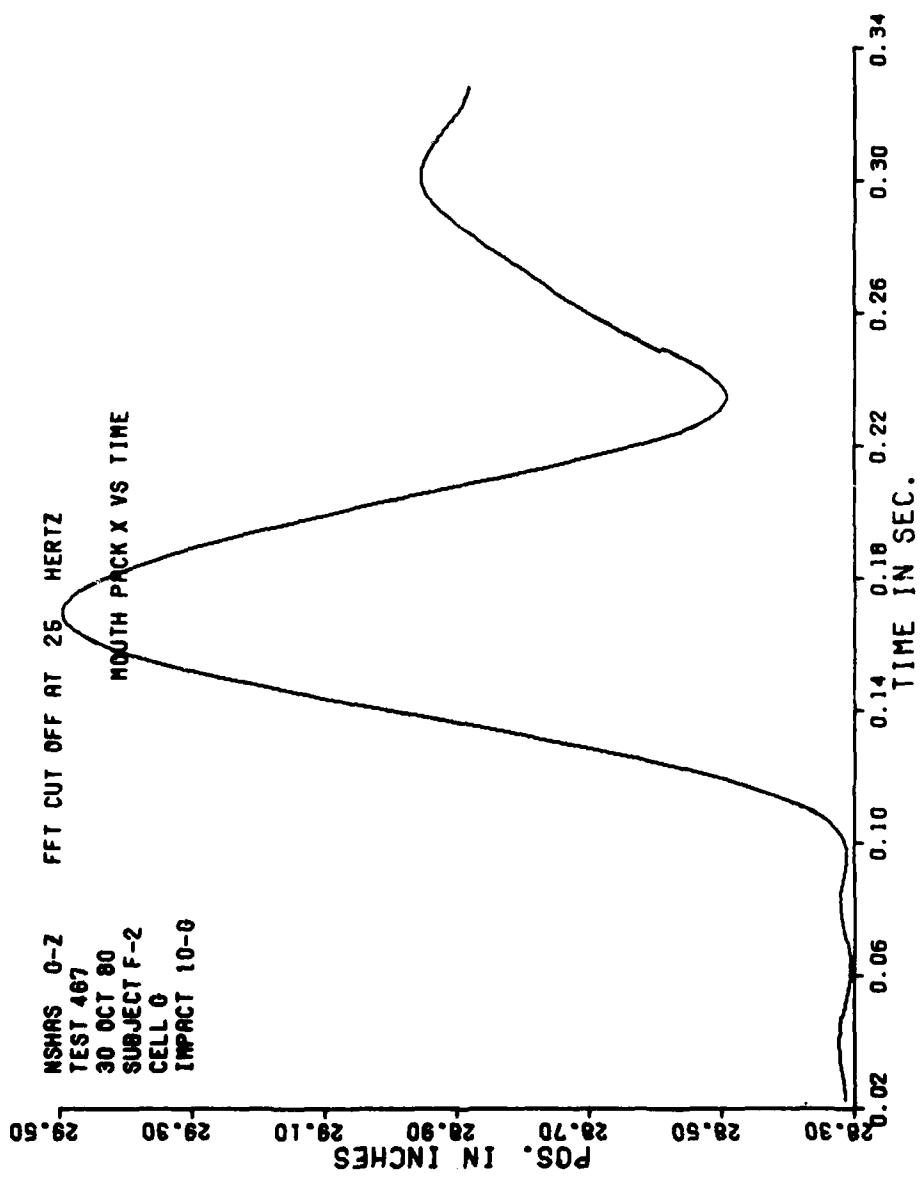
Figure D-3. Location of Fiducials  
(Hand-on-Knees Position).

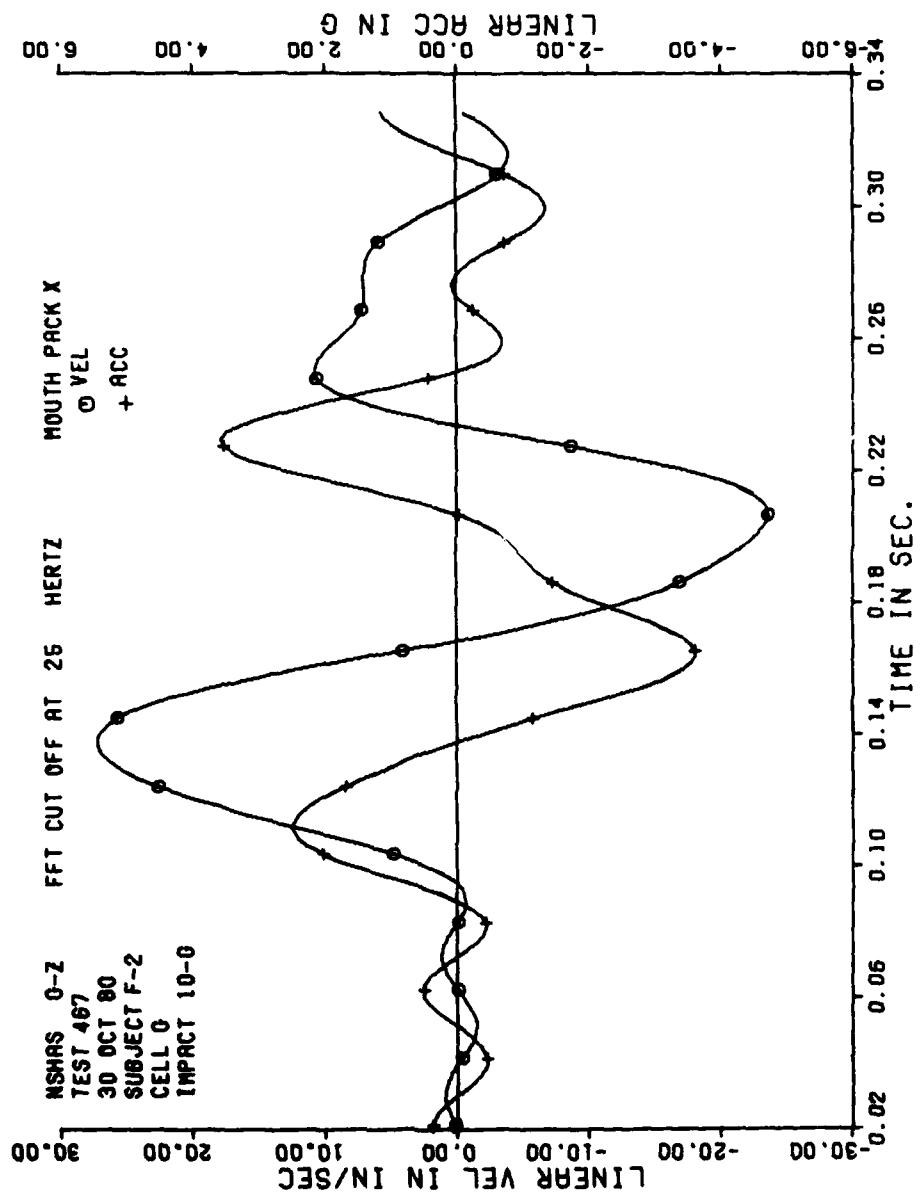
MSHAS 0-2 FFT CUT OFF AT 25 HERTZ  
TEST 467 ISOLATED SYMBOL MARKS PREDROP POSITION  
30 OCT 80 SUBJECT F-2  
CELL 0 IMPACT 10-0

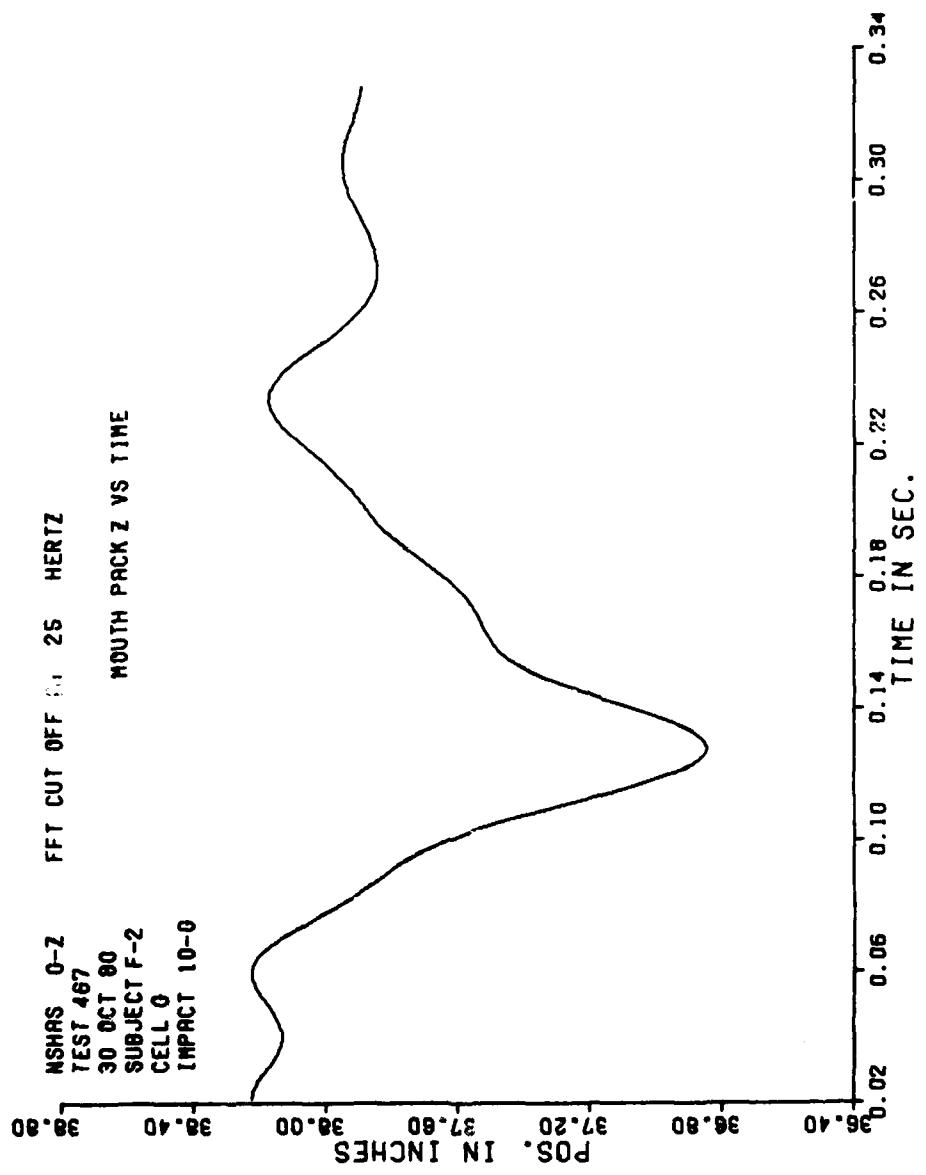
- © MOUTH PACK
- ▲ CHEEK
- + LOW HELMET
- X UP HELMET
- ♦ SHOULDER
- ◆ ELBOW

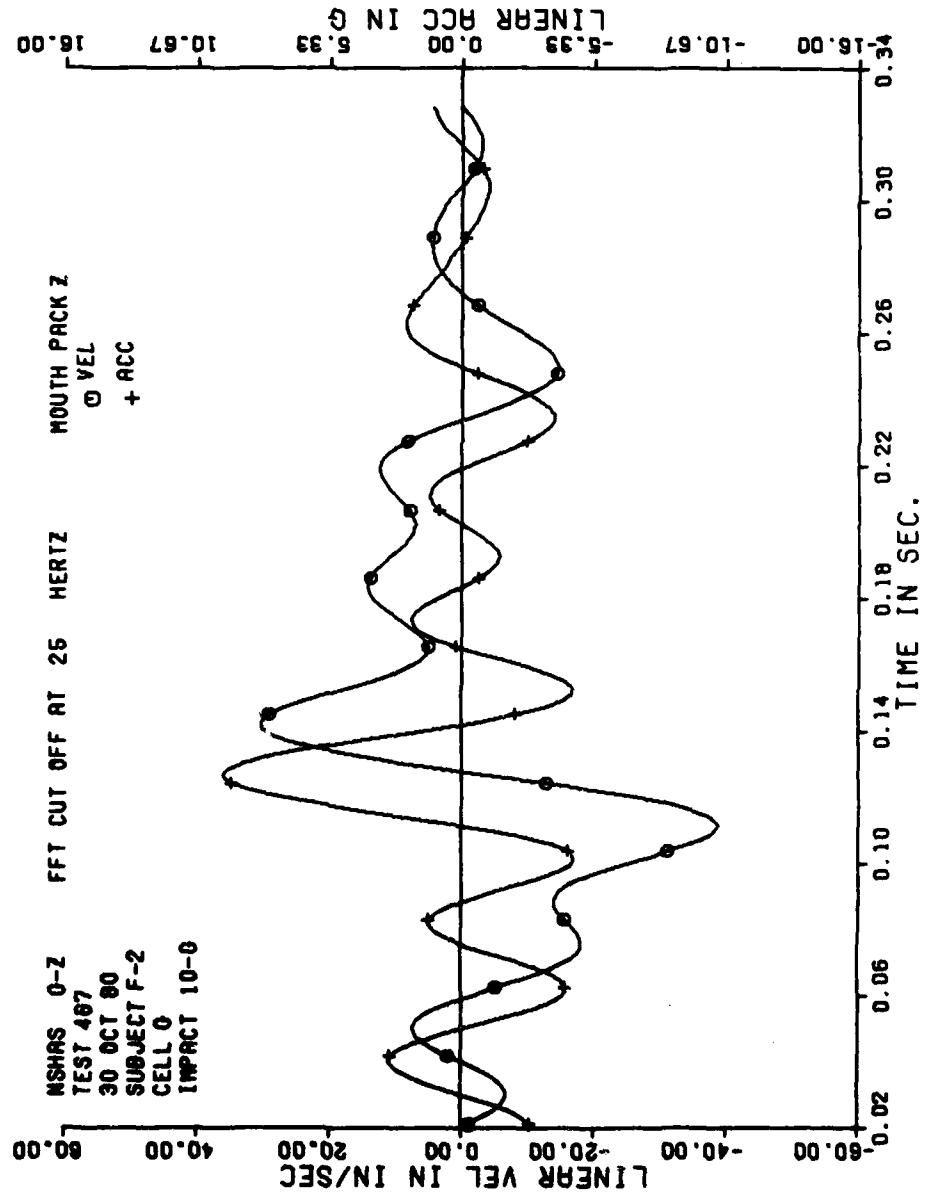
↑ DIRECTION  
OF IMPACT

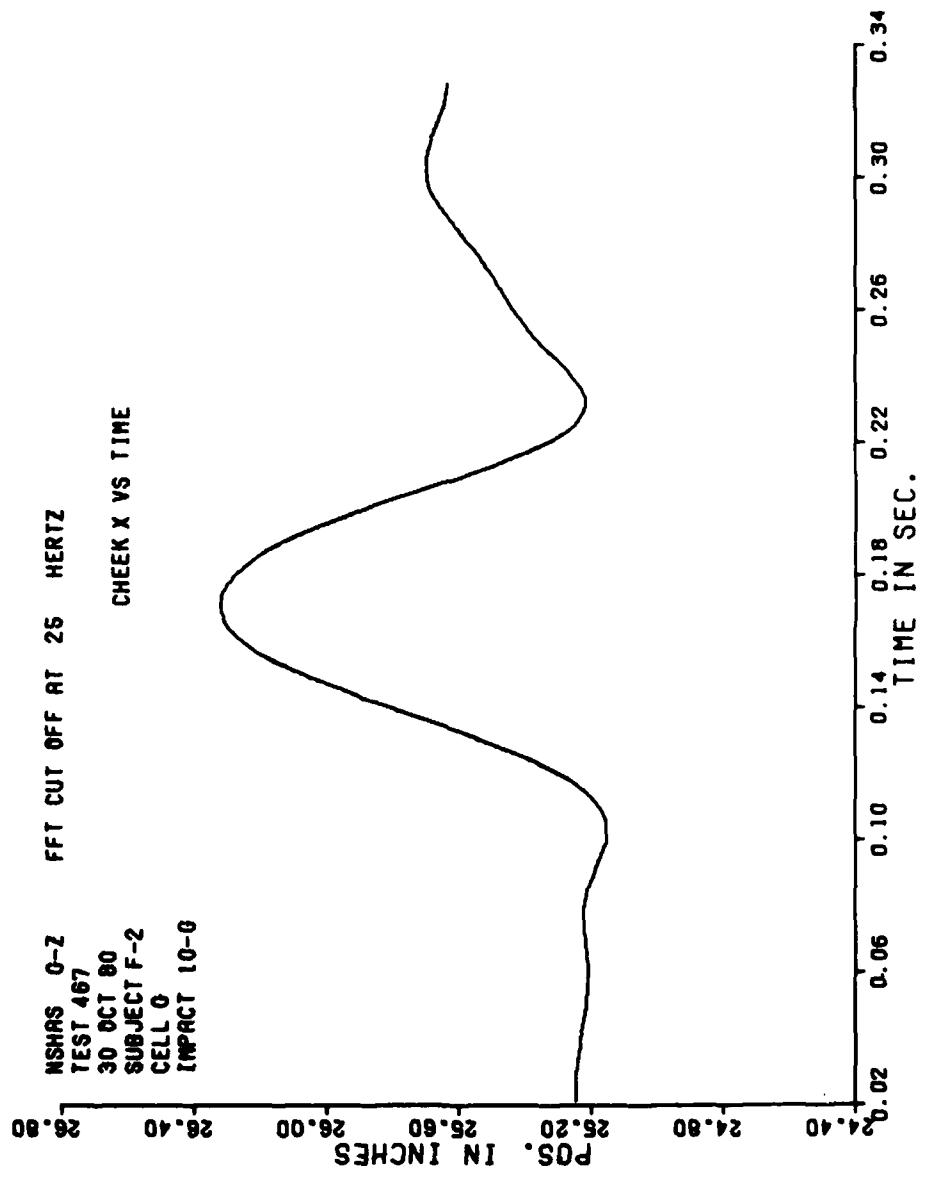


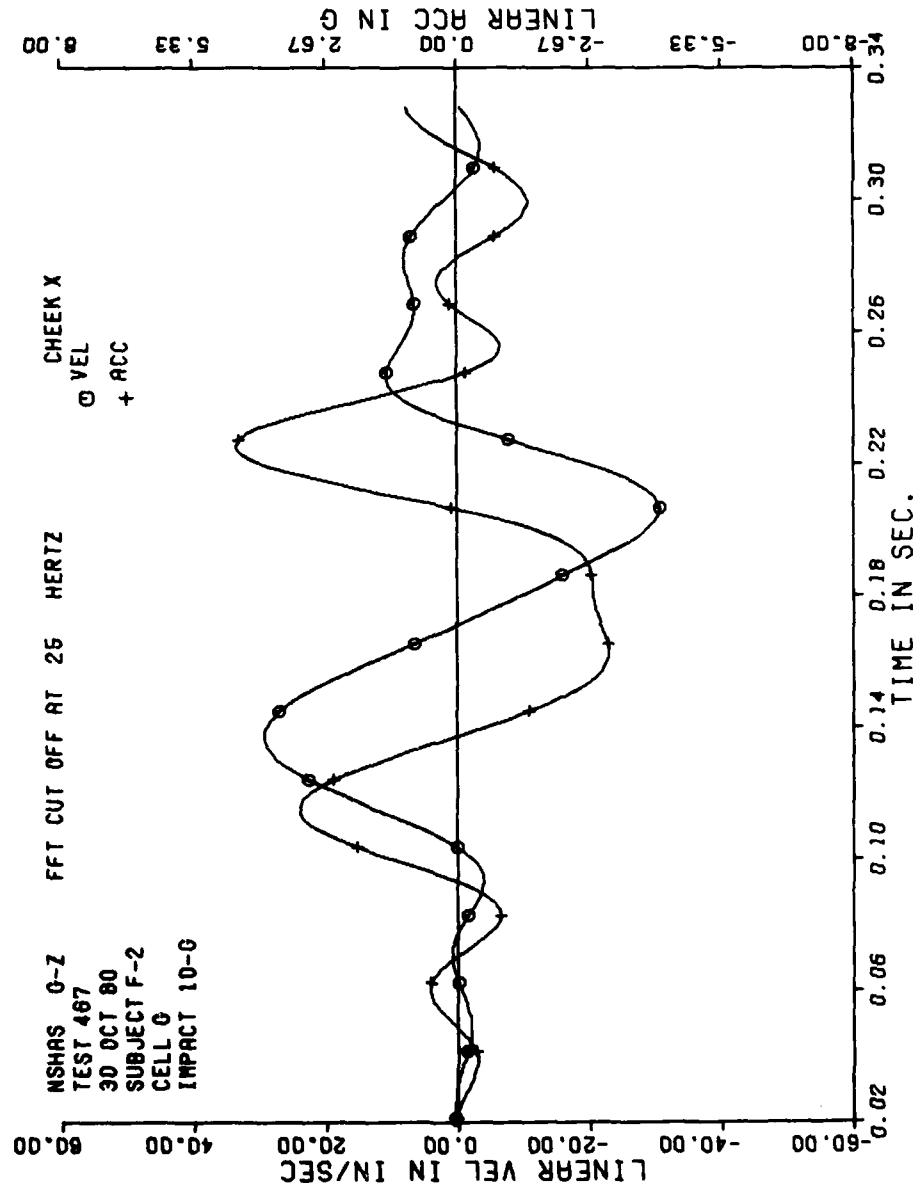


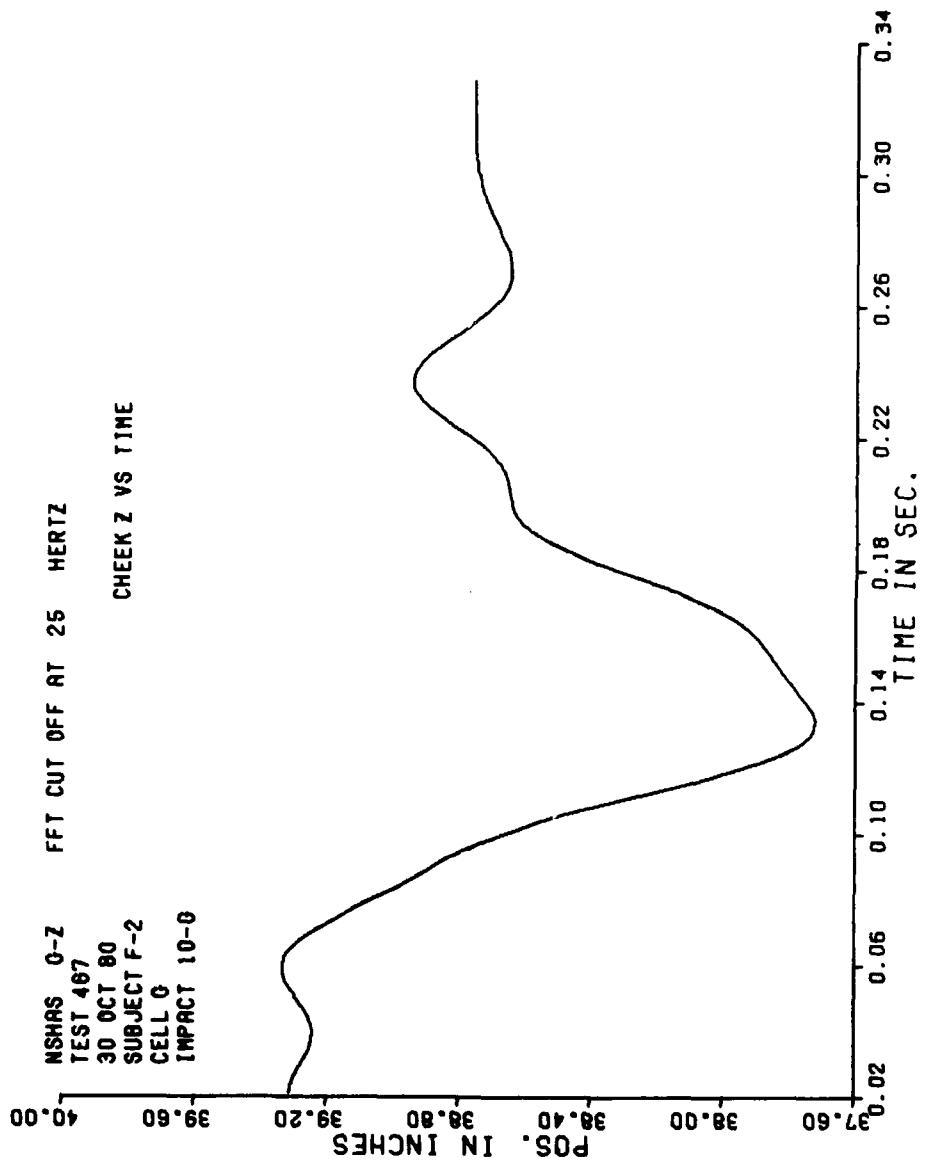


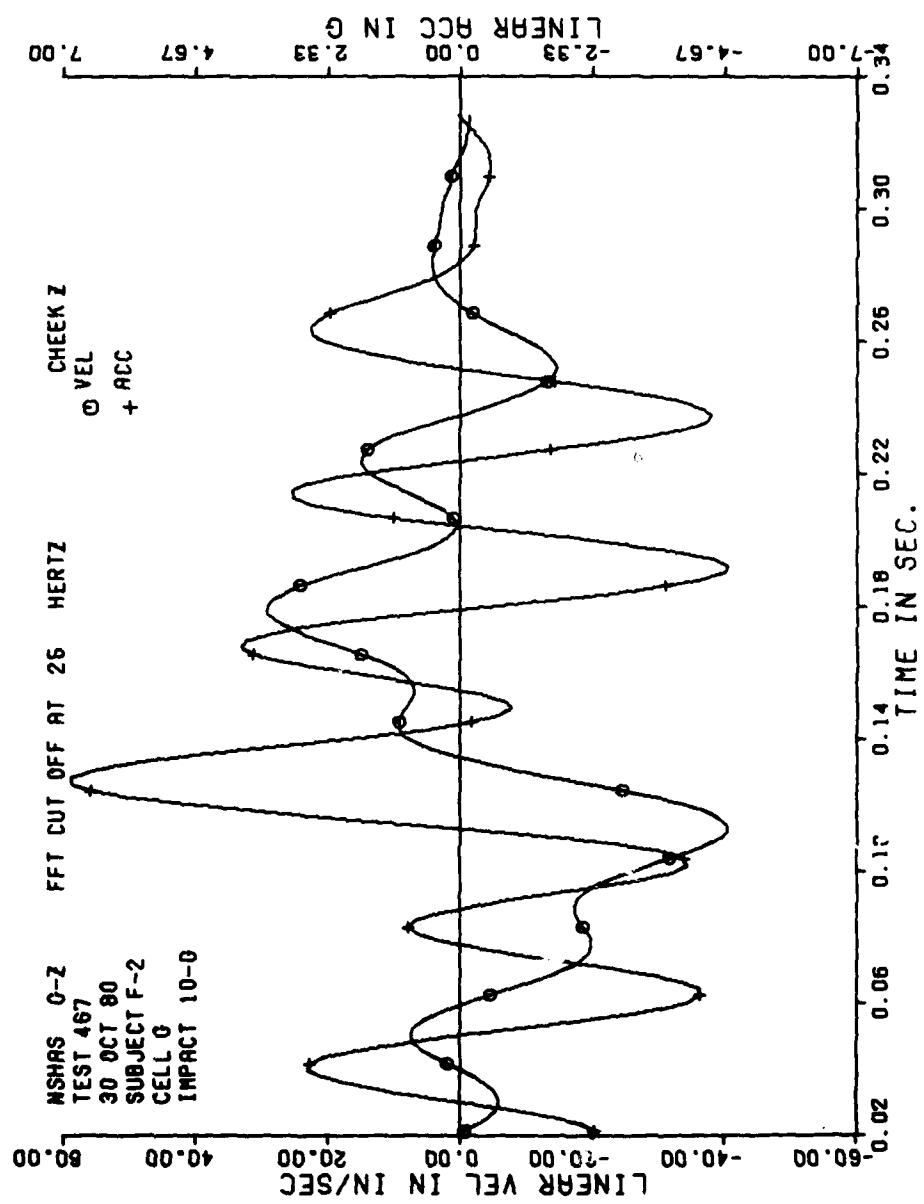


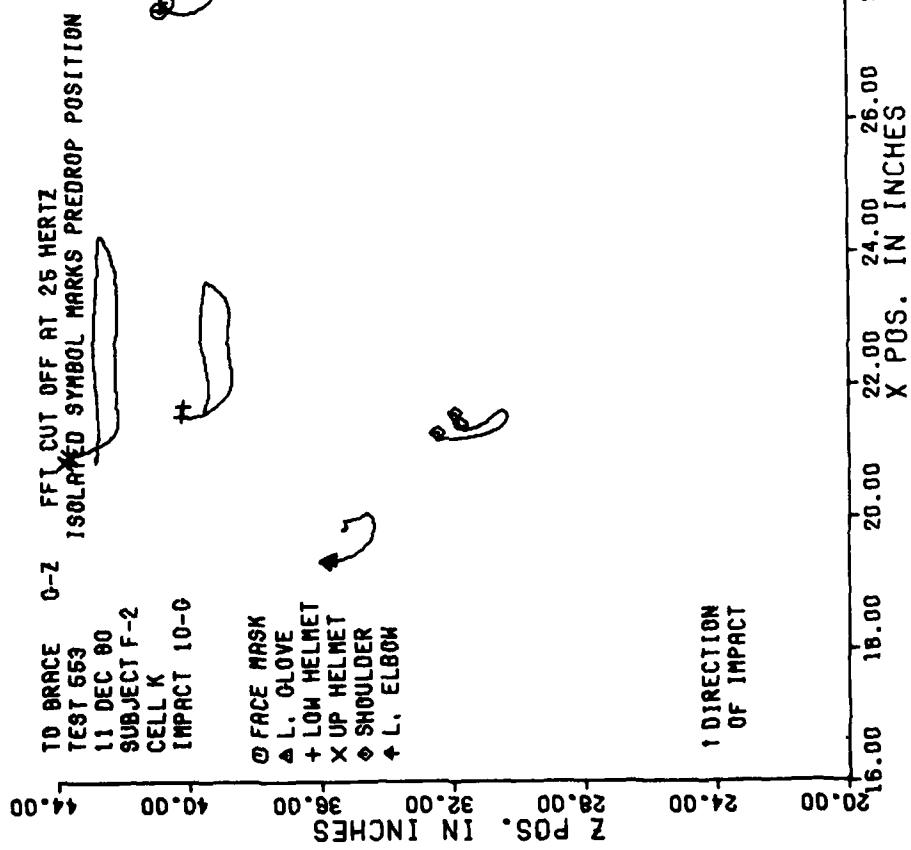


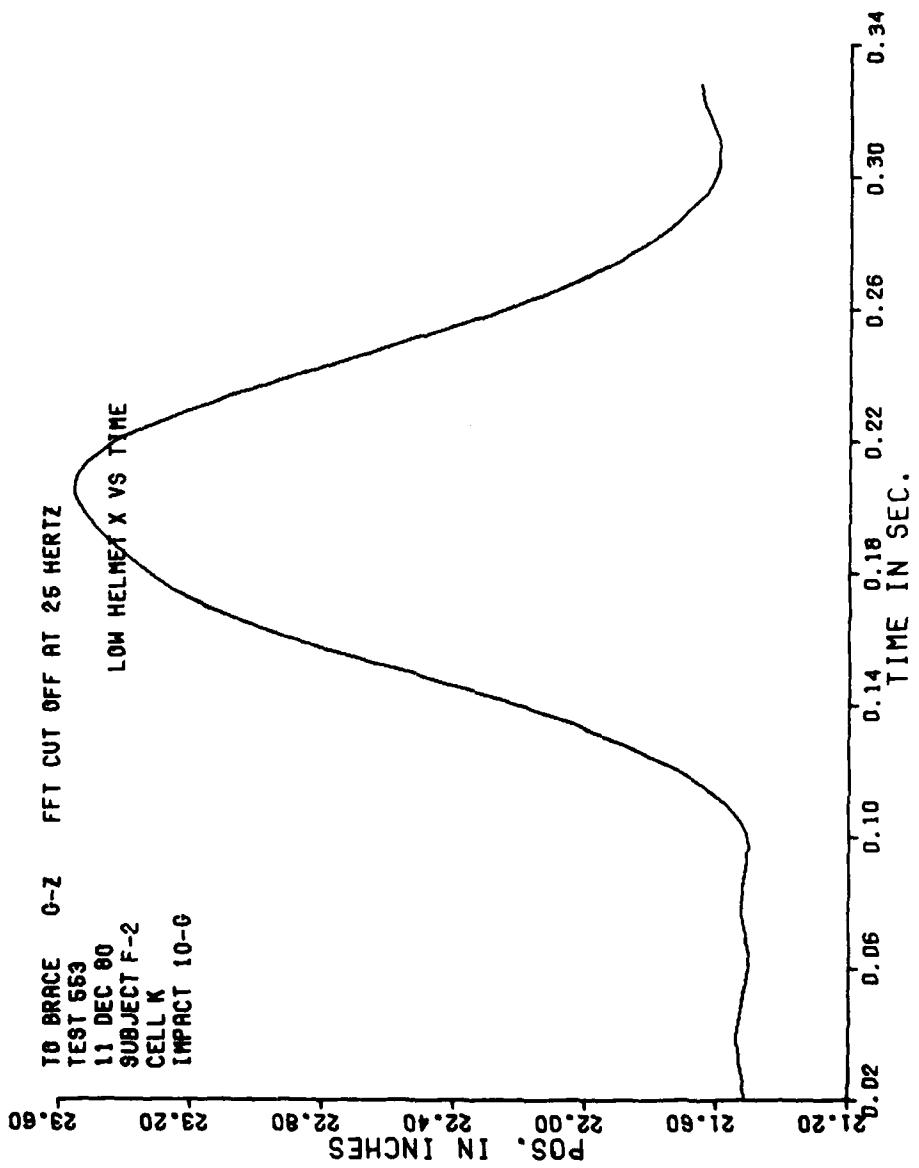


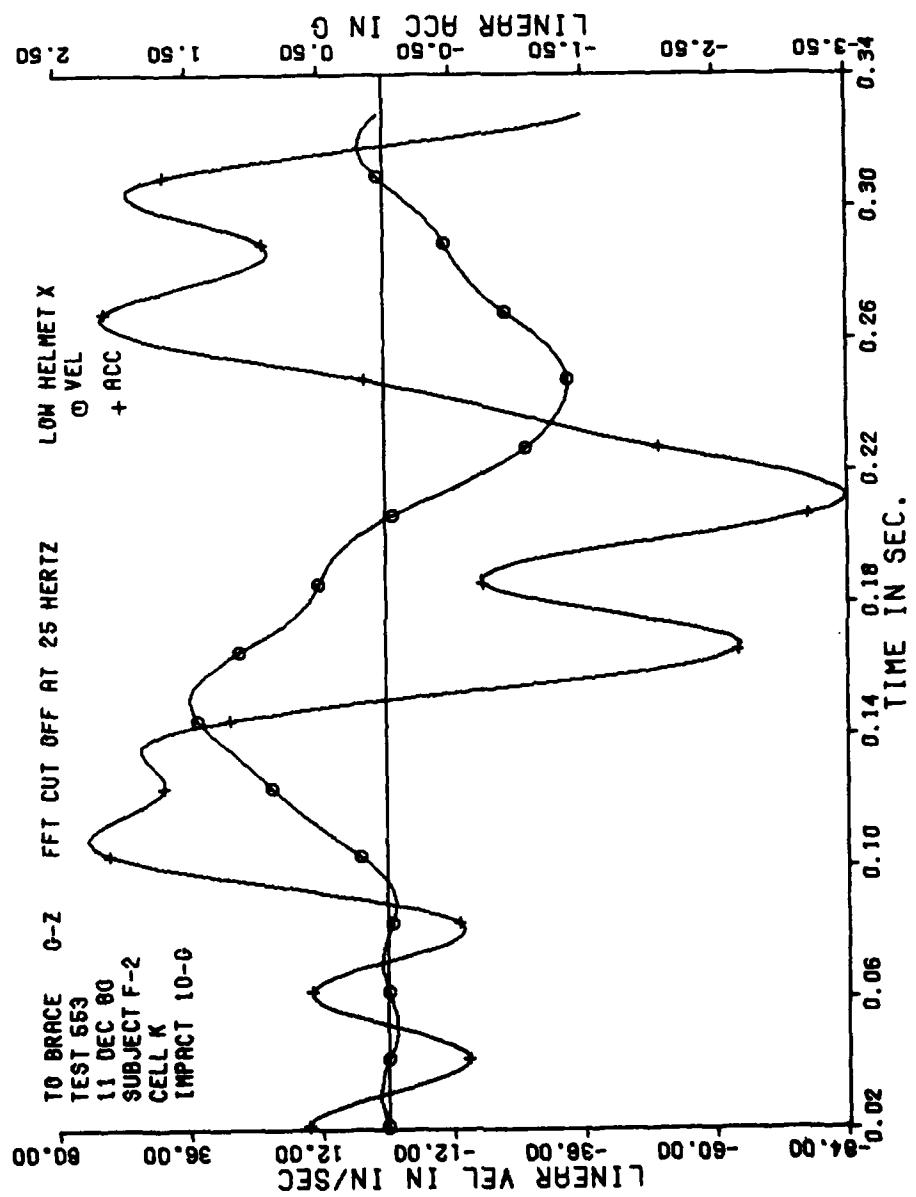


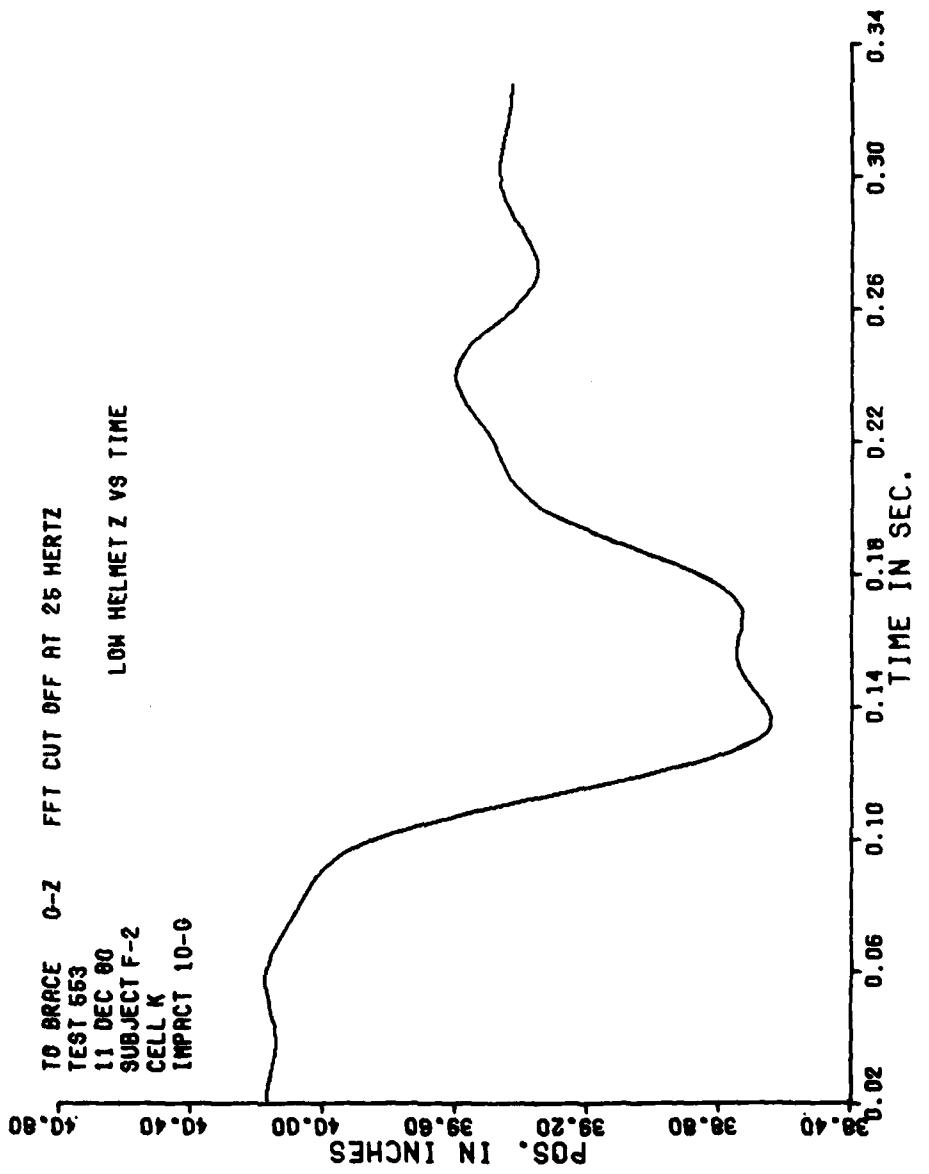


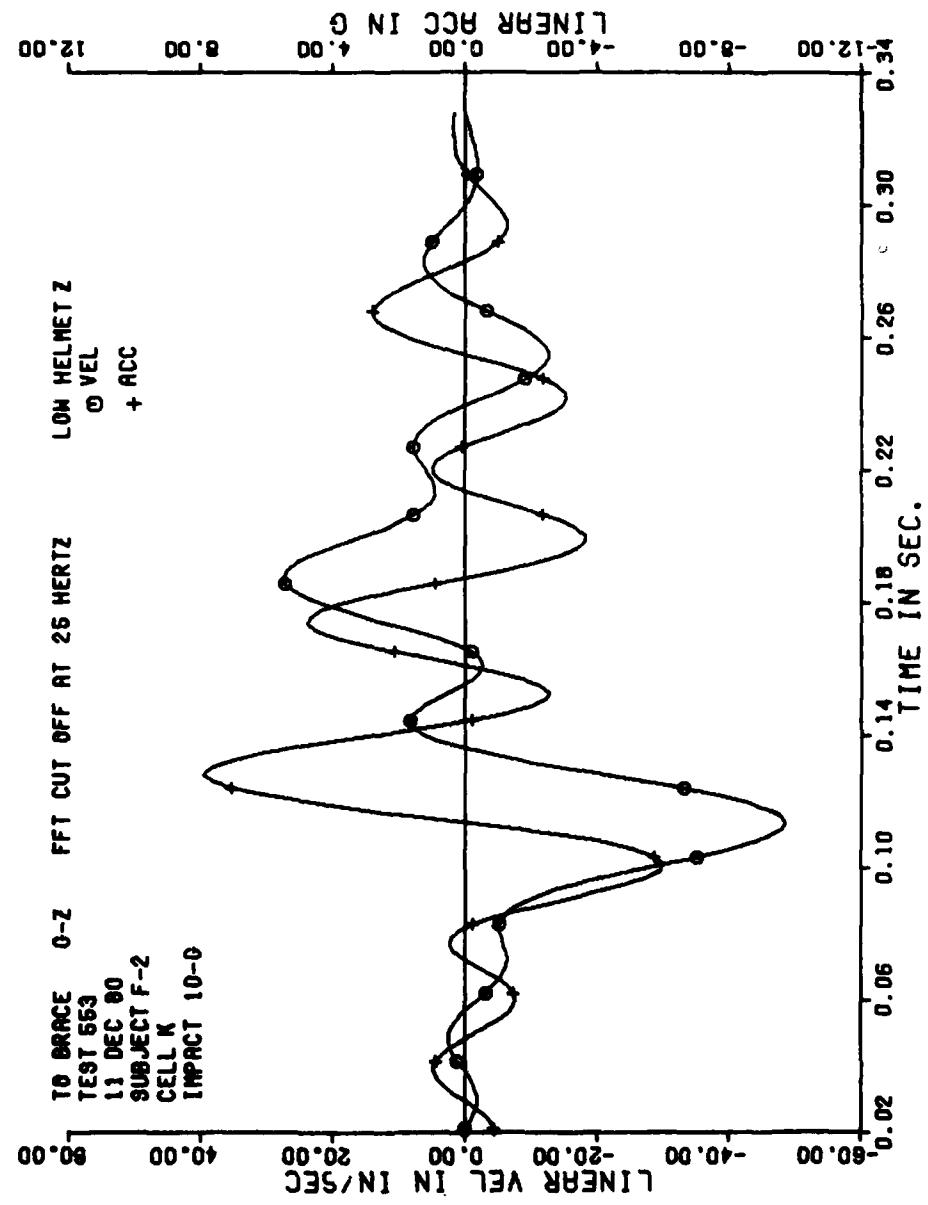


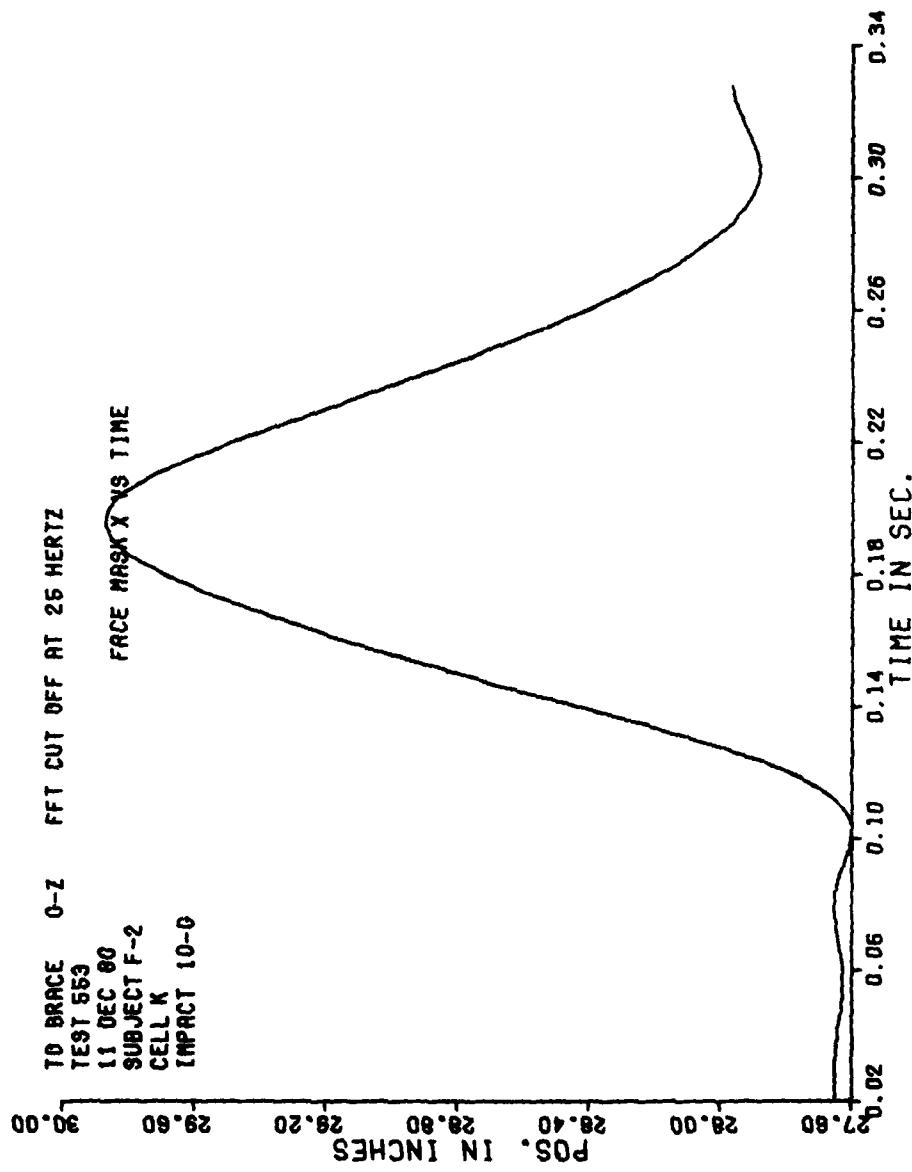


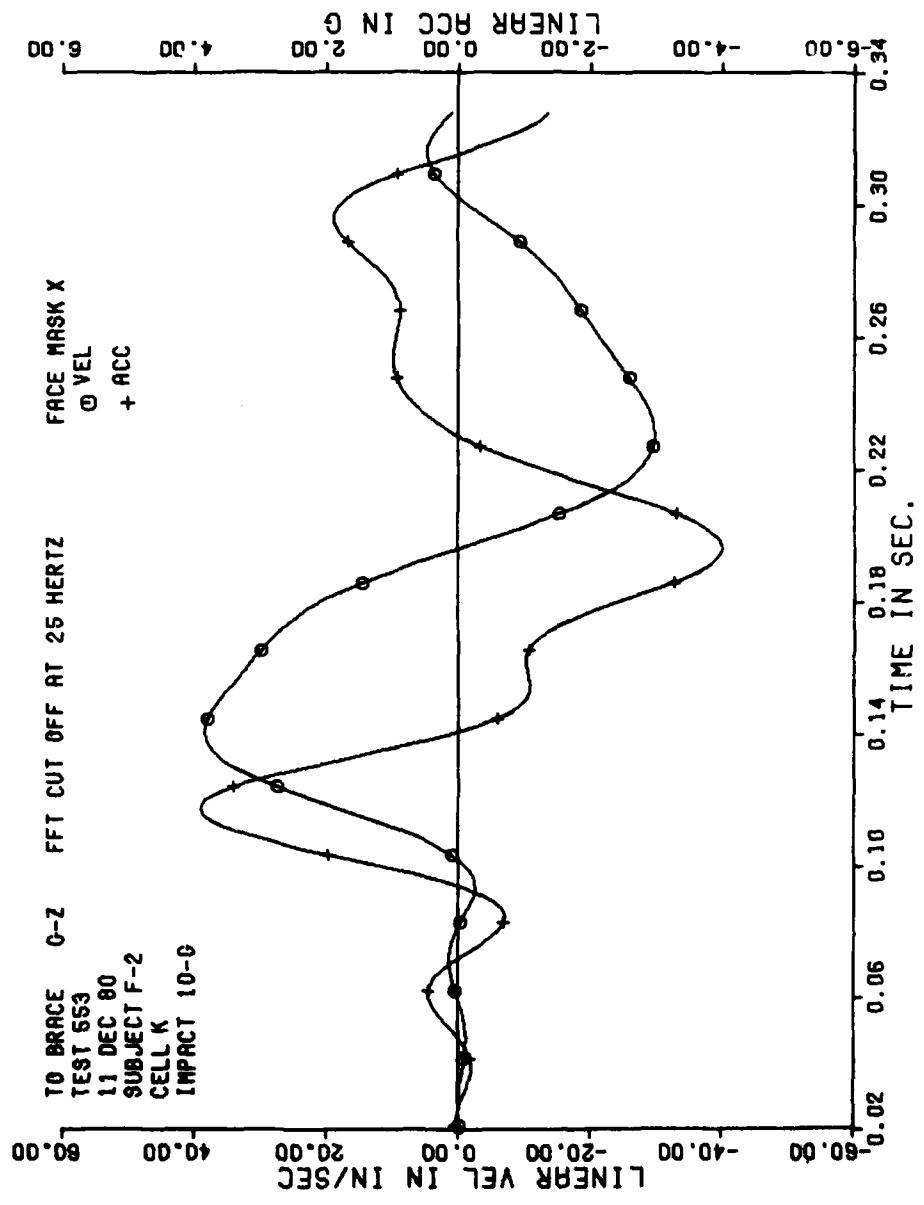


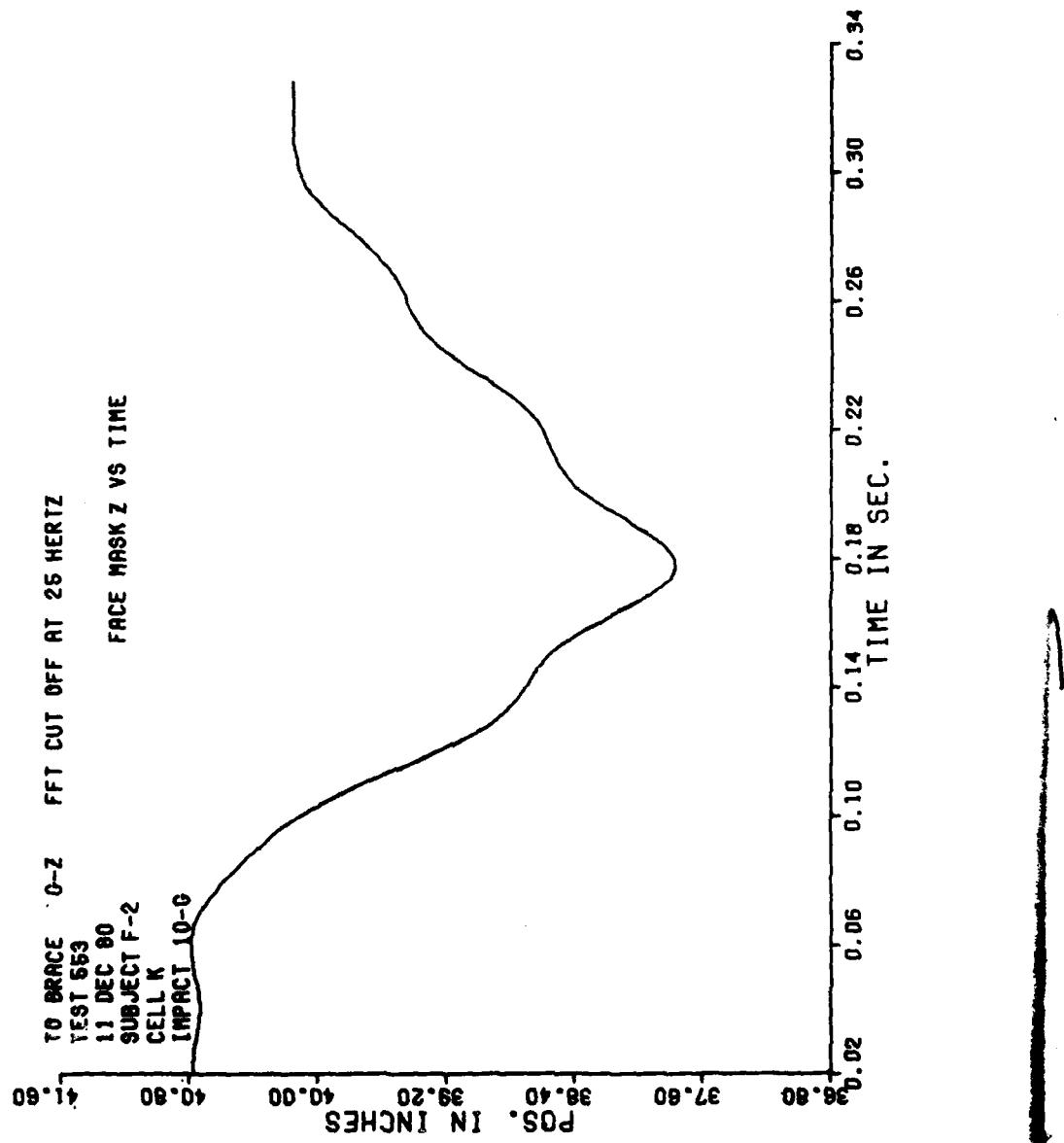


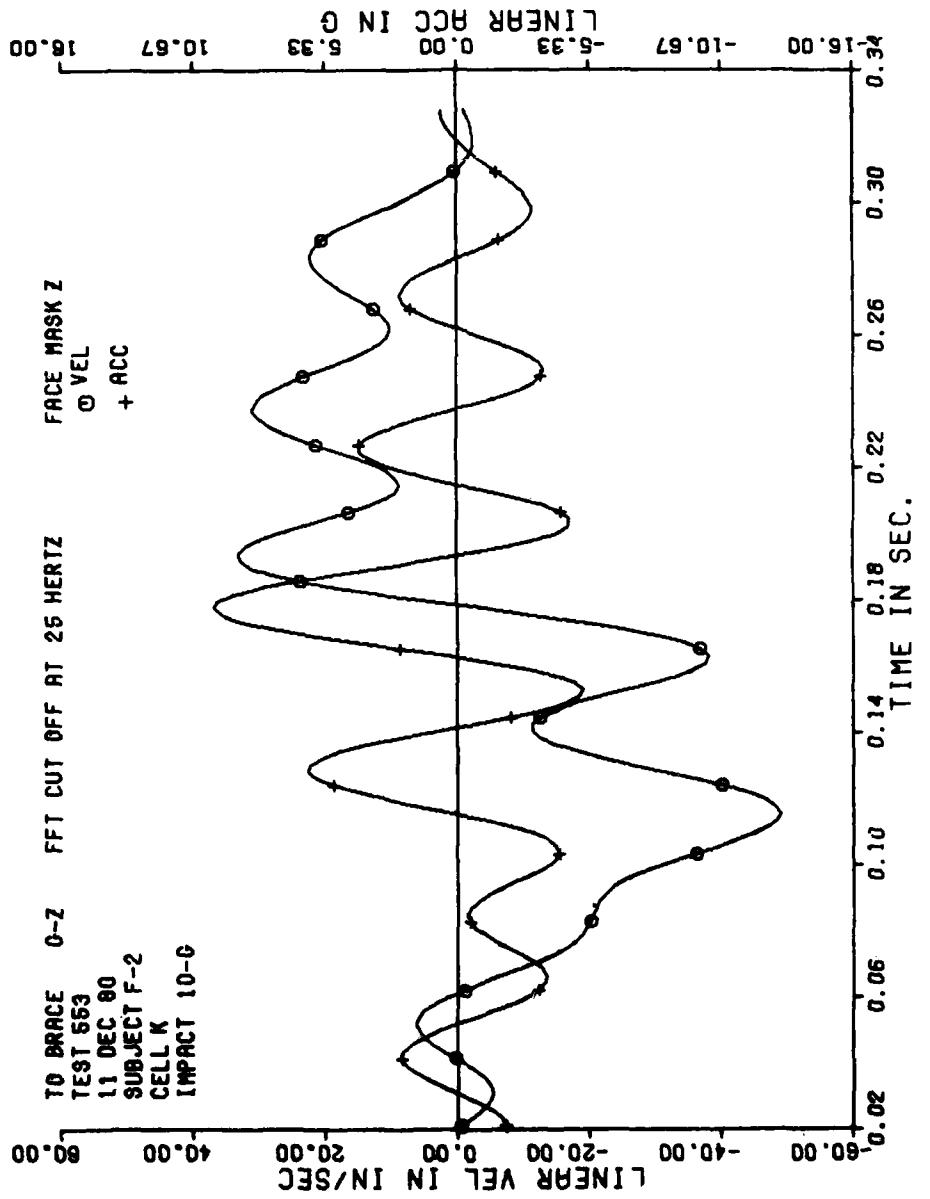












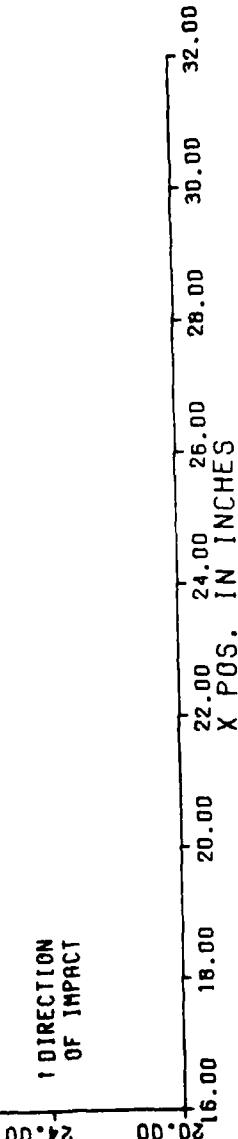
TO BRACE C-2 FFT CUT OFF AT 25 HERTZ  
TEST 562 ISOLATED SYMBOL MARKS PREDROP POSITION  
17 DEC 80 SUBJECT F-2

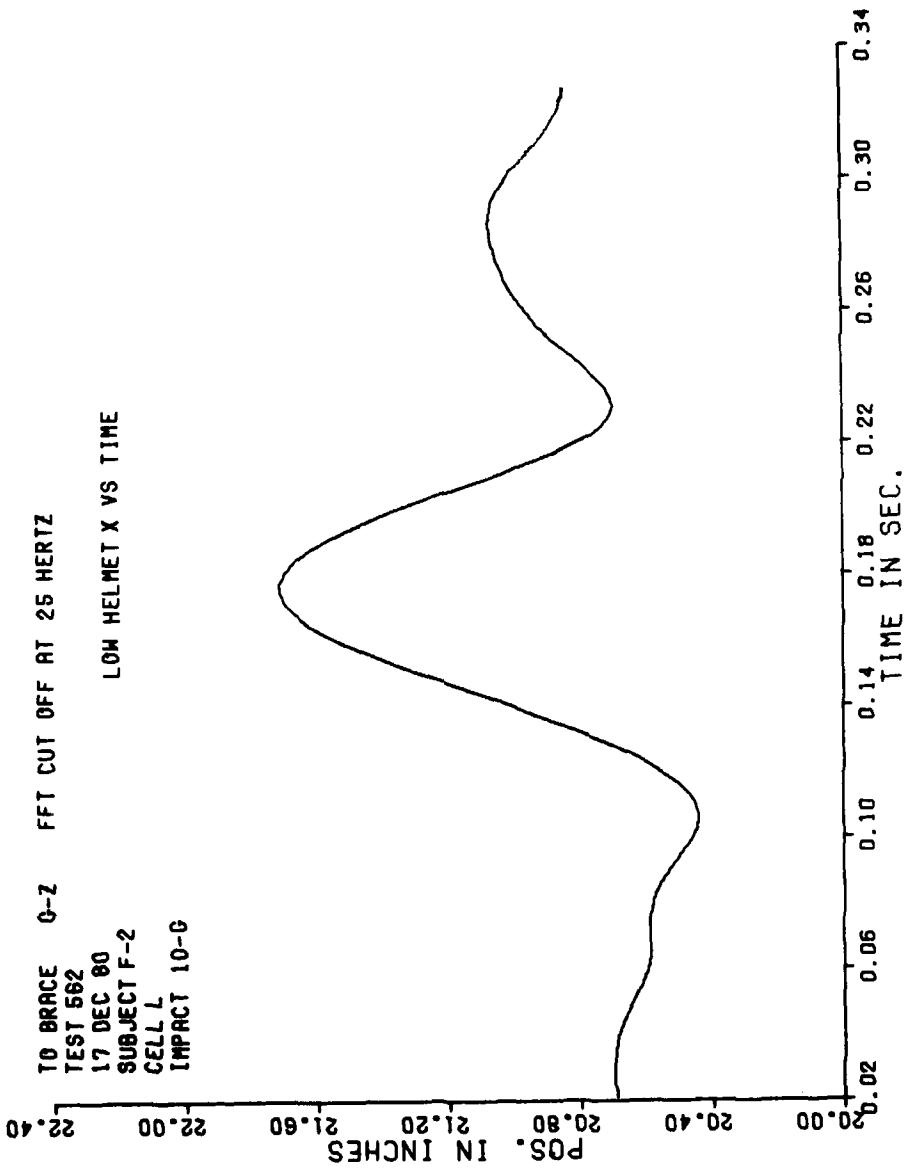
CELL L IMPACT 10-G

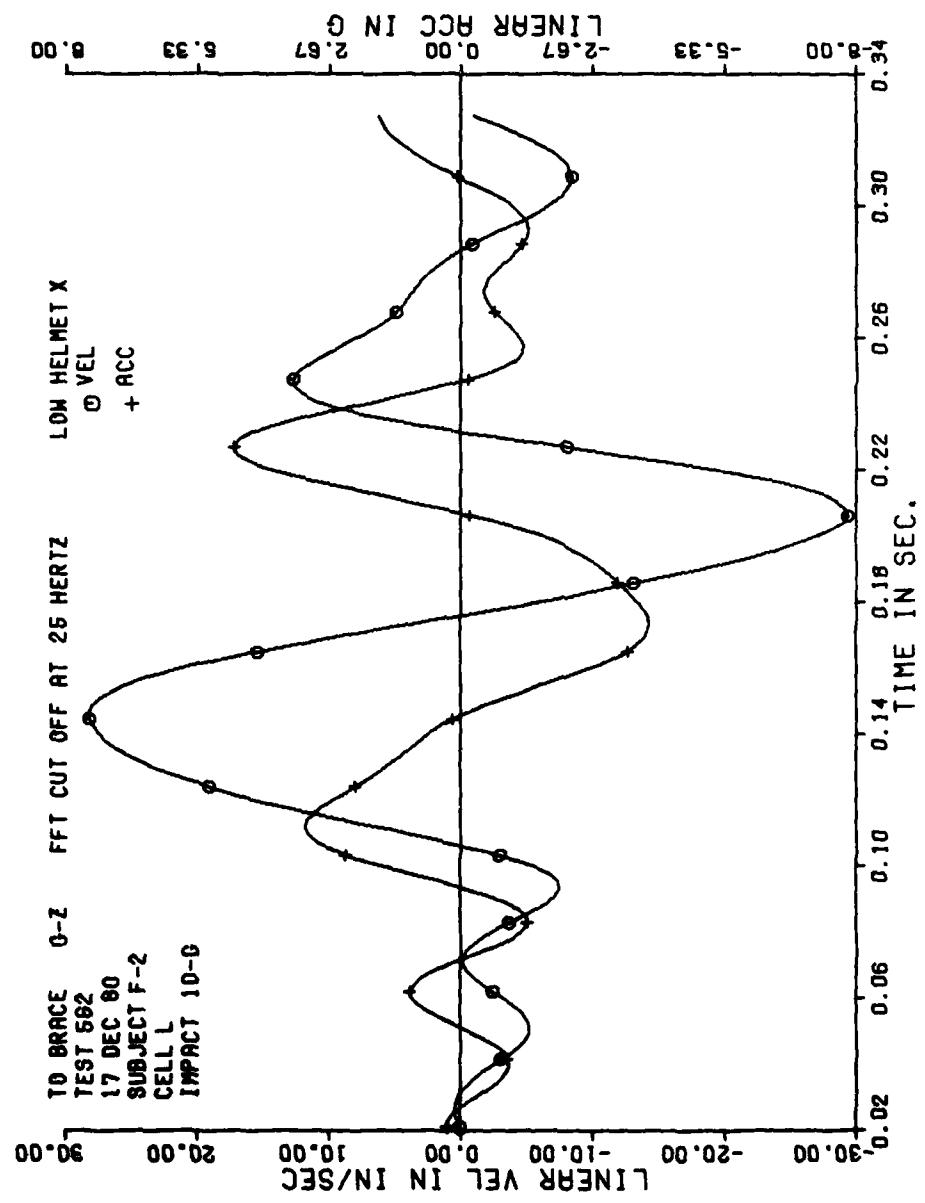
① FACE MASK  
▲ LOW HELMET  
+ UP HELMET  
X SHOULDER

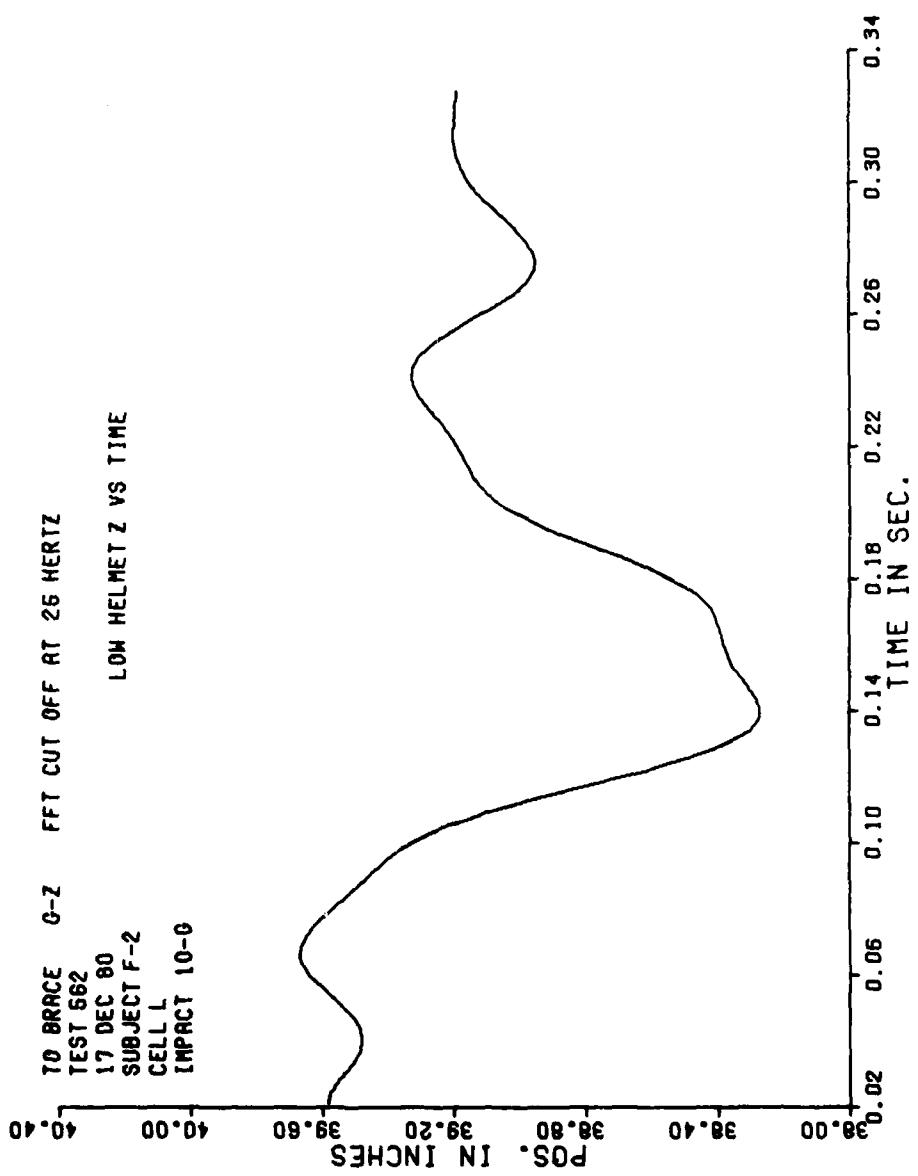
Z POS. IN INCHES 20.00 24.00 28.00 32.00 36.00

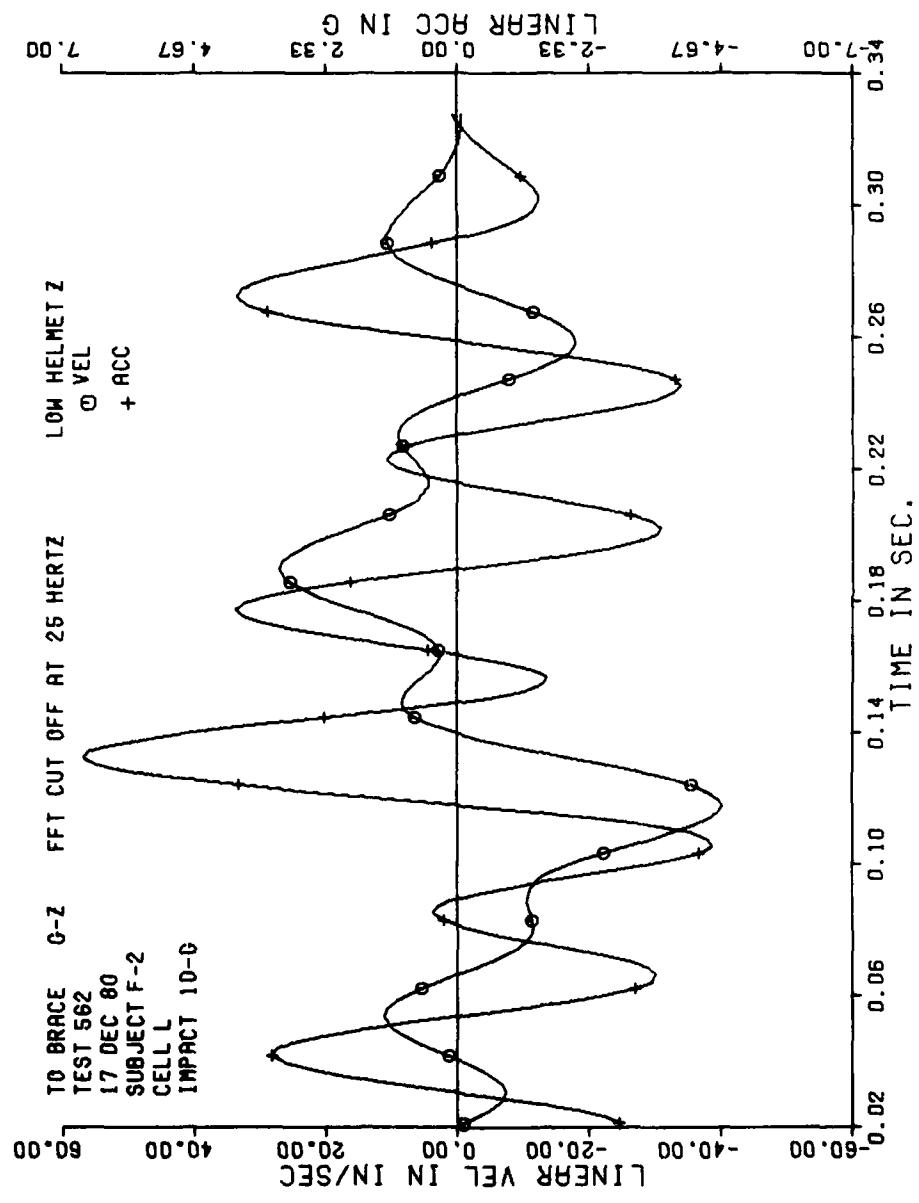
DIRECTION OF IMPACT

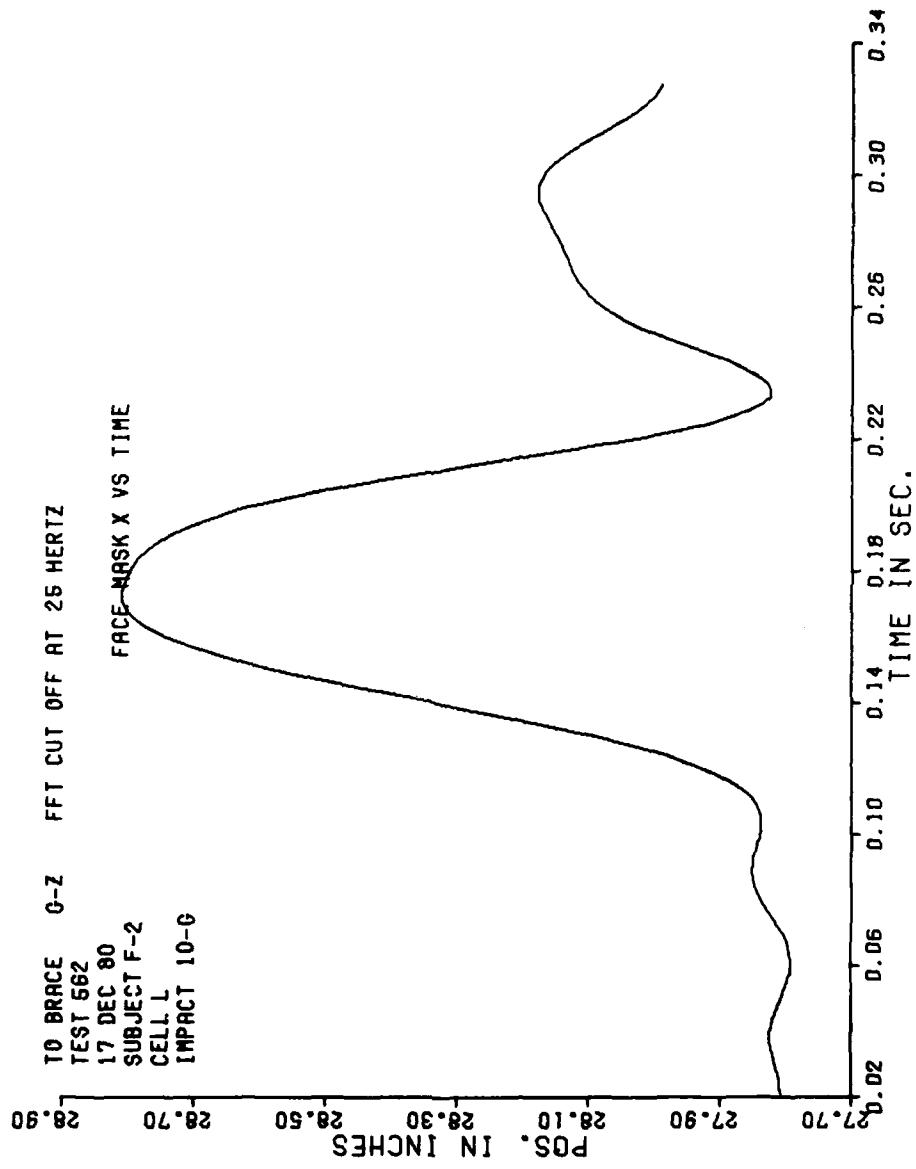


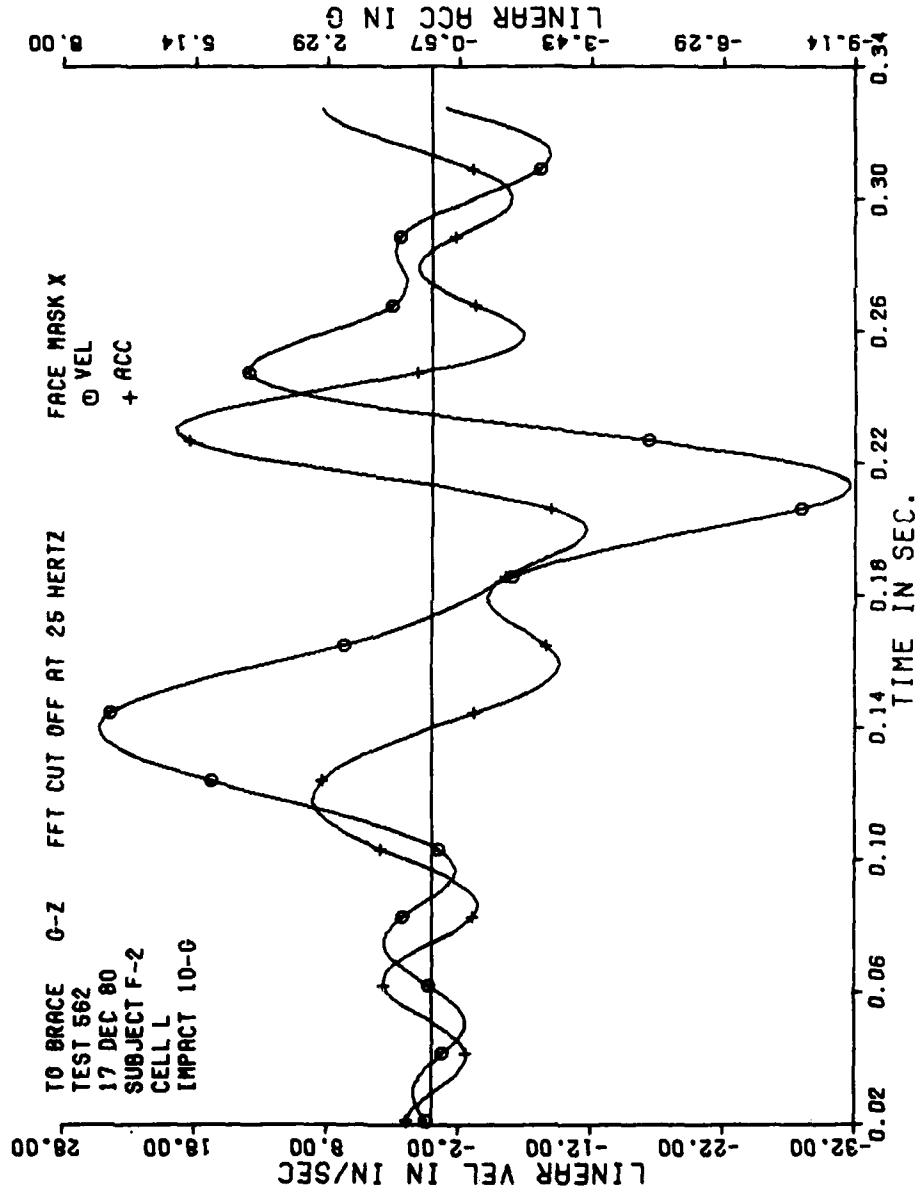


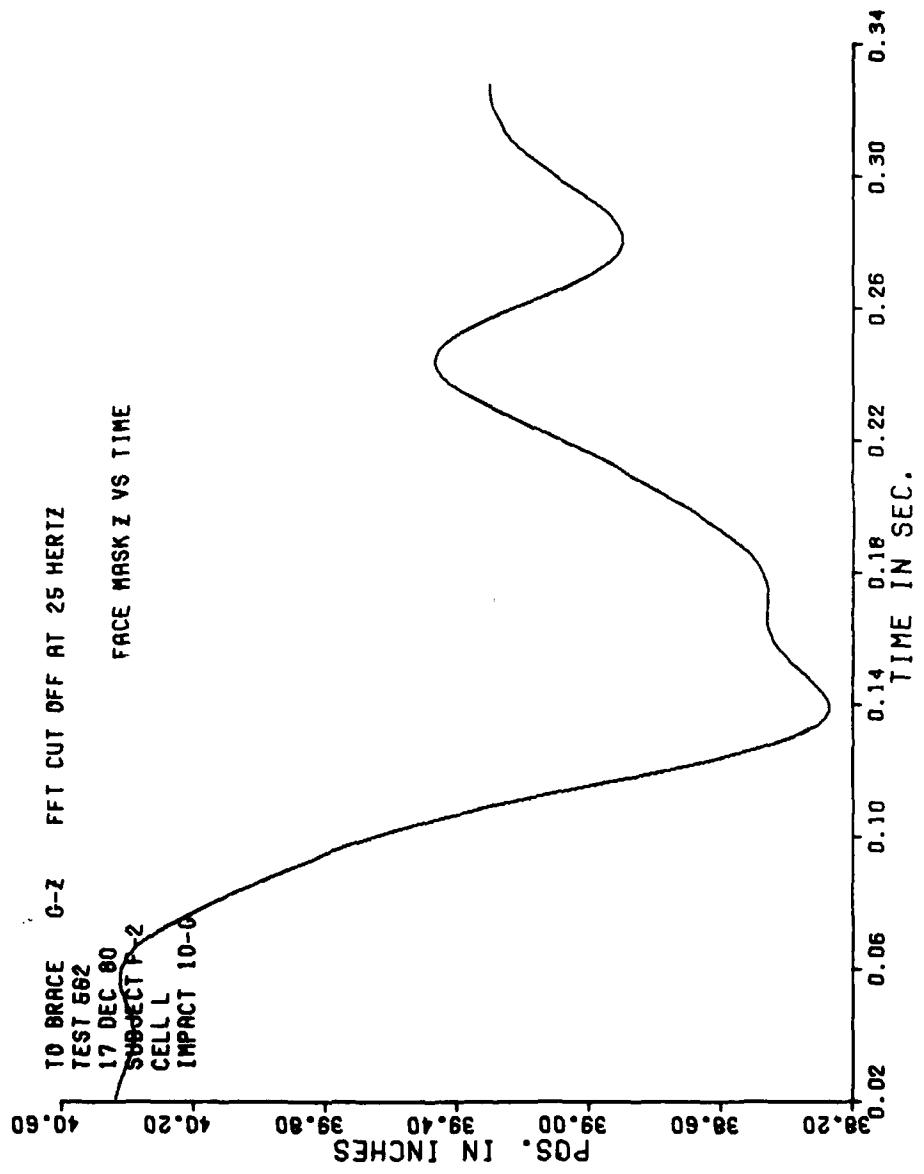


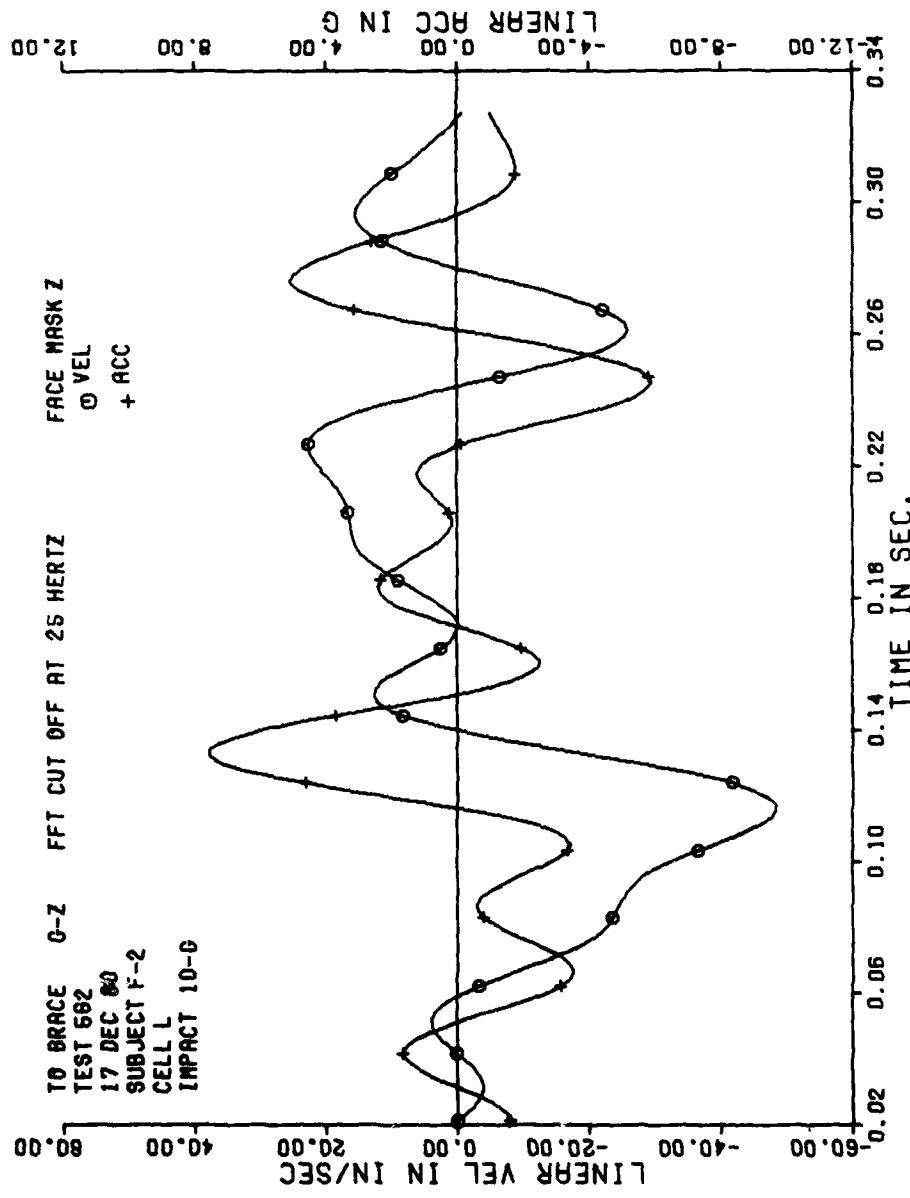












## REFERENCES

Begeman, P., A. King, R. Levine, and D. Viano, 1980, "Biodynamic Response of the Musculoskeletal System to Impact Acceleration" in Proceedings of the 24th Stapp Car Crash Conference, pp. 477-509.

Brinkley, J. W., E. Dearing, and L. Rauterkus, 1969, Evaluation of the Effects of Selected Egress System Design Parameters During +G<sub>x</sub> Acceleration, AMRL-TR-69-51, Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Brinkley, J. W., G. Mohr, H. Russell, S. Cooper, and J. Shaffer, 1977, Impact Tests of a Near-Production Air Cushion Restraint, AMRL-TR-75-47, Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Brinkley, J. W., J. H. Raddin, Jr., B. F. Hearon, L. A. McGowan, and J. M. Powers, 1981, Evaluation of a Proposed, Modified F/FB-111 Crew Seat and Restraint System, AFAMRL-TR-80-52, Air Force Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Brinkley, J. W., B. F. Hearon, and J. H. Raddin, Jr., L. A. McGowan, and J. M. Powers, 1982, Influence of F/FB-111 Crew Seat and Restraint Configuration Changes on Responses of Volunteers to +G<sub>x</sub> Impact, in preparation, Air Force Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Carter, R., 1959, Human Tolerance to Automatic Positioning and Restraint Systems for Supersonic Escape, Report No. NA59H-220, North American Aviation, Inc.

Ewing, C. W., D. J. Thomas, L. Lustick, E. Becker, G. Willems, and W. H. Muzzy III, 1976, "The Effects of the Initial Position of the Head and Neck on the Dynamic Response of the Human Head and Neck to -G<sub>x</sub> Impact Acceleration" in Proceedings of the 20th Stapp Car Crash Conference, pp. 487-512.

Gadd, C. W., 1966, "Use of Weighted Impulse Criterion for Estimating Injury Hazard" in Tenth Stapp Car Crash Conference, Society of Automotive Engineers, Inc., New York.

Graf, P. A., H. T. Mohlman, and R. C. Reboulet, October 1978, Photometric Methods for the Analysis of Human Kinematic Responses to Impact Environments, AMRL-TR-78-94 (ADA-062006), Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Hearon, B. F. and J. H. Raddin, Jr., 1981, "Experience with Highly Selective Screening Techniques for Acceleration Stress Duty" in The Effect of Long-Term Therapeutics, Prophylaxis and Screening Techniques on Aircrew Medical Standards, AGARD-CP-310, Toronto, Canada.

Hearon, B. F., J. W. Brinkley, R. J. Luciani, and H. E. von Gierke, 1981, F/FB-111 Ejection Experience (1967-1980) - Part 1: Evaluation and Recommendations, AFAMRL-TR-81-113, Air Force Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Hearon, B. F., 1981, F/FB-111 Ejection Experience (1967-1980) - Part 2: Summary of Accident Investigation Reports, AFAMRL-TR-81-114, Air Force Aerospace Medical Research Laboratory, Wright-Patterson Air Force, Ohio.

Hearon, B. F., H. A. Thomas, and J. H. Raddin, Jr., 1982, "Mechanism of Vertebral Fracture in the F/FB-111 Ejection Experience", accepted for publication in Aviation, Space and Environmental Medicine.

Hearon, B. F., J. W. Brinkley, and J. H. Raddin, Jr., L.A. McGowan, and J. M. Powers, 1982, Comparative Vertical Impact Testing of the F/FB-111 Crew Restraint System and a Proposed Modification, AFAMRL-TR-82-13, Air Force Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Hendler, E., J. O'Rourke, M. Schulman, M. Katzeff, L. Domzalski, and S. Rodgers, 1974, "Effect of Head and Body Position and Muscular Tensing on Response to Impact" in Proceedings of 18th Stapp Car Crash Conference, pp. 303-337.

Henzel, J., 1967, The Human Spinal Column and Upward Ejection Acceleration: An Appraisal of Biodynamic Implications, AMRL-TR-66-233, Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Kazarian, L. E., 1977, F/FB-111 Escape Injury Mechanism Assessment, AMRL-TR-77-60, Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio.

Kazarian, L. E., K. Beers, and J. Hernandez, 1979, "Spinal Injuries in the F/FB-111 Crew Escape System" in Aviation, Space, and Environmental Medicine, 50(9): 948-957.

Lombard, C., S. Ames, H. Roth, and S. Rosenfeld, 1951, "Voluntary Tolerance of the Human to Impact Accelerations of the Head" in Journal of Aviation Medicine, 22(6): 109-116.

Reader, D. C., 1967, The Restraint Afforded by the USAF and Proposed RAF IAM Seat Harnesses for the F-111 Under High Forward and Lateral Decelerations, FPRC/Memo 241, RAF Institute of Aviation Medicine, Farnborough, Hants, England.

Savely, H. E. and W. H. Ames, 1946, Memorandum Report on Laboratory Tests of Catapult Ejection Seat Using Human Subjects, Eng. Div. Memo. Rpt. No. TSEAA-695-66C, Engineering Division, Air Materiel Command, Army Air Forces.

Simons, S., J. Hoffman, N. Ingold, P. Grubel, K. Saenz, and H. Norman, June 1979, Laboratory Tests of the Nine Accelerometer Package Calibration (NAPCAL), ADTC-TR-79-51, Central Inertial Guidance Test Facility, 6585th Test Group, Holloman Air Force Base, New Mexico.

Wilcoxon, F. and R. A. Wilcox, 1964, Some Rapid Approximate Statistical Procedures, Lederle Laboratories, New York.

Zaborowski, A. V., November 1965, "F-111 Pilot Restraint Harness Biological Adequacy Tests", 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico.